

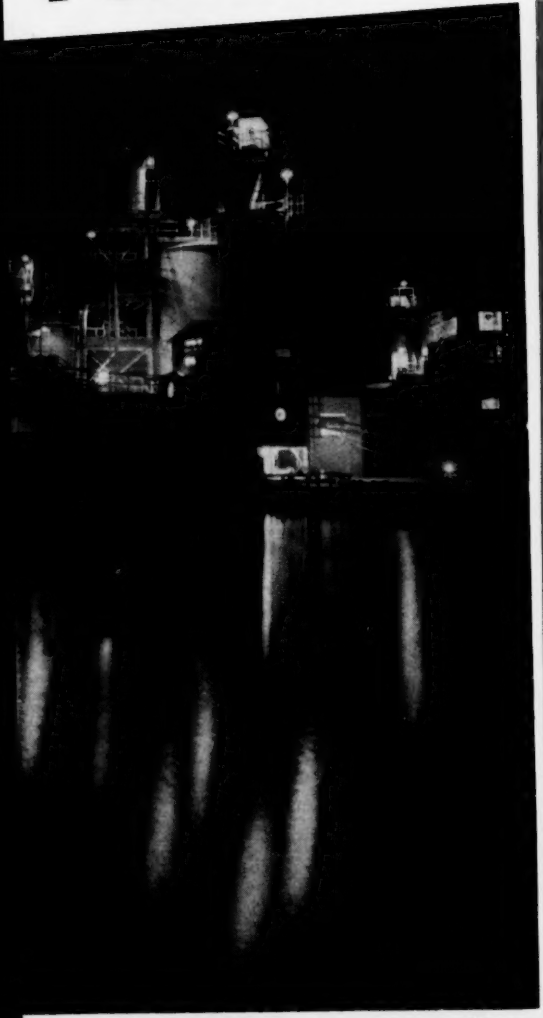
Chemical Week

October 26, 1957

Price 35 cents

PLASTICS OUTLOOK

CW Report
page 114



Atomic disaster in England spews radioactive iodine over 200-mile area. Full story p. 21

In your plant: How many maintenance men per production worker? New survey gives averages . p. 49

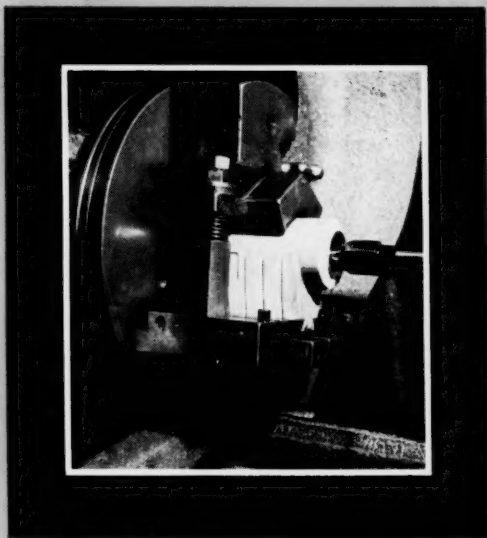
New uses for lithium are goal of Princeton research. Focus: polymerization catalysis p. 73

◀ Room for new magnesia output? Here's comprehensive rundown of plants, capacities p. 95

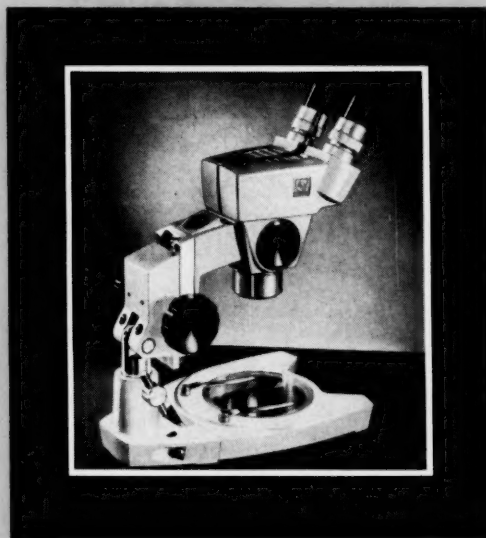
SAACI hears purchasing agent plead at last week's clinic for "sincerity" in selling p. 103

EPON[®] RESIN does it !

Protects precision optical instruments
from abrasion and perspiration acid



AO Microscope body with Epon finish is chucked, faced to size, bored, reamed and threaded. Yet the tough Epon finish comes through without a nick or scratch.



A smooth coating of Epon resin-based paint protects AO Stereoscopic Microscopes from abrasion, chemical deterioration and mechanical impact.

Here's how:

At the American Optical Company, Instrument Division, painted castings for scientific and ophthalmic instruments frequently are machined after the finish has been applied. What happens to the finish? *Nothing*. Why? It is protected by the amazing abrasion-resistance of Epon resin-based coatings.

But scuff-resistance is only part of the story. Customer complaints about perspiration acid peeling the coatings on instruments presented

another very serious problem.

To counteract this problem, AO chemists put an Epon resin-based paint to the test. Castings with 2 coats of Epon resin-based paint and others with 2 coats of ordinary paint were immersed in the same solution of 5% sodium chloride, 5% acetic acid, 3% isovaleric acid, 3% butyric acid and water for 96 hours. Result: holes had formed in the ordinary paint finish. The Epon resin coating . . . *still in flawless condition.*

Most paint users are already aware of the many advantages offered by Epon resin formulations . . . excellent adhesion, resistance to abrasion and impact, ability to withstand extremes of heat, humidity, and the attack of corrosive chemicals. Your Shell Chemical representative will explain how you can take full advantage of Epon resins in your paint and enamel formulations. Write for: "Epon Resins for Surface Coatings" and "Epon Resin Esters for Surface Coatings."

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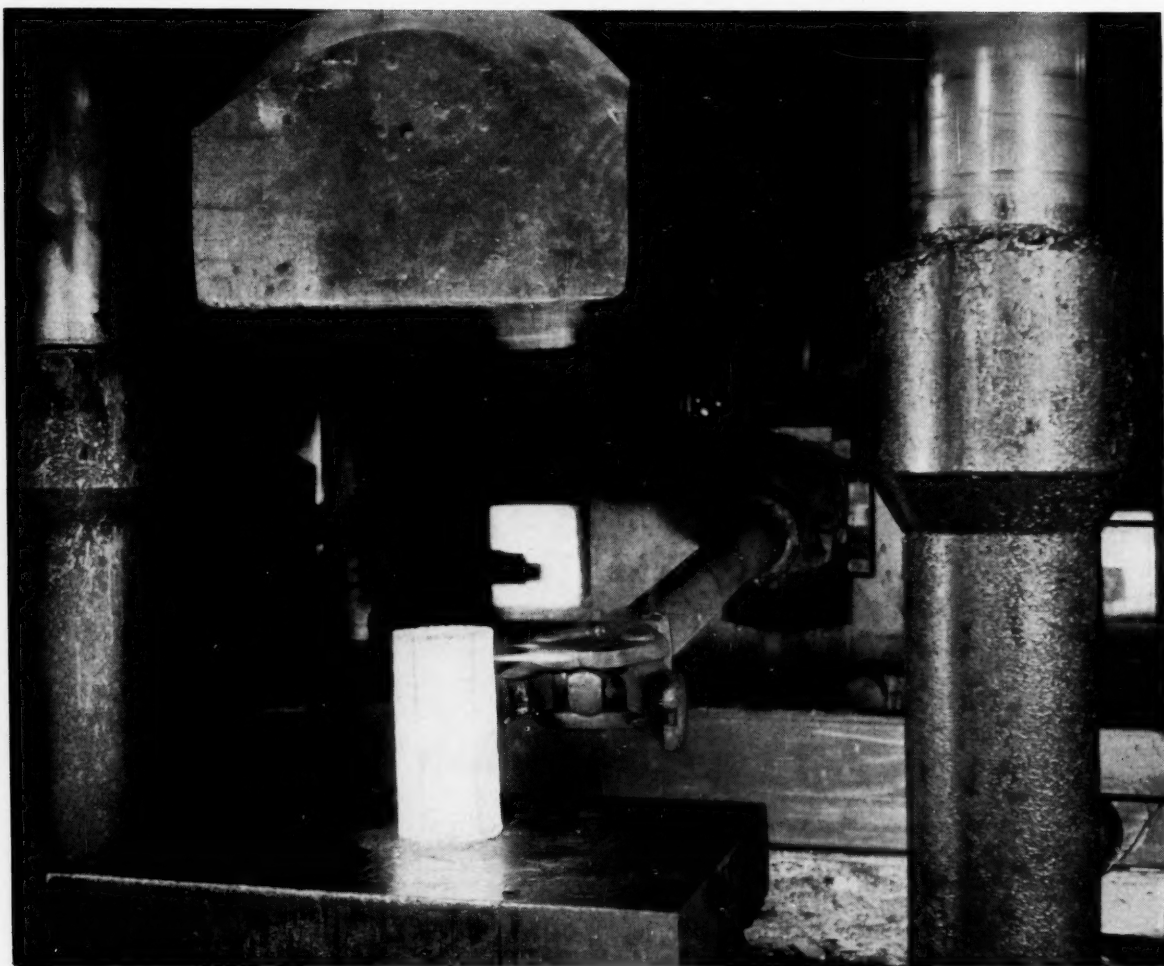


Photo courtesy Cameron Iron Works, Inc., Houston, Texas, and Linear, Inc., Philadelphia, Pa.—Manufacturers of Precision Molded Seals

How 4 lbs. of rubber can pack a 1000-ton load

To batter a billet into rough shape for machining is no chore for the hydraulic forging press shown above. A press of a button and it works down the hot steel with a thousand tons of pressure every several seconds.

But it was a chore to find an adequate seal for the big press ram. Its designers looked long and hard before they found a split ring packing that would not leak under the high pressure and fast traverse.

Twin secret of the success of the fabric-reinforced, precision-molded, rubber rings now used is their unique design—and CHEMIGUM. A series of internal, V-shaped dams and external abutments seal off any labyrinth leakage, while the CHEMIGUM assures a lastingly tight fit.

The reasons why the ring manufacturer uses CHEMIGUM for these and other precision seals are its excellent resistance to oil, heat and abrasion plus its unusual ease of processing. How can you use this outstanding combination of properties to advantage? For details, including the latest *Tech Book Bulletins* on CHEMIGUM, write to Goodyear, Chemical Division, Dept. J-9417, Akron 16, Ohio.



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At the hub of major rail, water and truck routes, the new Texaco Lockport plant serves many industries: Refrigeration, metal working and refining, explosives, plastics, textiles and dyeing, petroleum refining, and pulp and paper.

TEXACO LOCKPORT (ILL.) AMMONIA PLANT NOW MAKING DELIVERIES

Orders for anhydrous ammonia are mounting. The advantages of doing business with Texaco Lockport are compelling:

Texaco closeness: The new ammonia plant is centered in the industrial Midwest. Availability is certain. Shipping distances are shorter. Service is faster and better.

Texaco uniformity: The Lockport plant is new from top to bottom—new processing equipment to assure product uniformity; new handling equipment; and a brand-new transport fleet to speed deliveries and protect purity in transit.

Texaco service: Texaco is famous for its service. The

Texaco man will see that your orders are handled according to instructions and that deliveries are scheduled to tie in with your operations.

For fast reliable petrochemical service, call or write The Texas Company, *Petrochemical Sales Division*, 332 South Michigan Avenue, Chicago 4, Illinois, or 135 East 42nd Street, New York 17, N. Y.



TEXACO
PETROCHEMICALS

- ▶ **Can unions refuse to handle cargo from a struck plant?** The legality of "hot-cargo" clauses in union contracts is about to be reviewed by the Supreme Courtp. 24
- ▶ **Harshaw is concentrating on chemical manufacture**—not on chemical distribution, the field in which it got its start p. 29
- ▶ **A fast-setting, high-strength glue** gives Eastman Chemical Products an entry to industrial and household adhesive marketsp. 59
- ▶ **New catalyst system** gives uranium processors a big incentive to evaluate the carbonate leaching processp. 87

15 OPINION

15 MEETINGS

17 BUSINESS NEWSLETTER

21 Atomic accident in Great Britain gives some new ammunition to those who oppose locating nuclear reactors in populous areas.

23 Koppers buys interest in Strategic Materials; will assist in exploiting novel chemical processes.

Management men can expect some changes in union bargaining tactics next year—and last week's International Chemical Workers convention gives clues to the changes.

24 Hot-cargo clauses in union contracts will finally be scrutinized by the Supreme Court.

Government officials have issued a new set of rules covering contractors' reimbursible and nonreimbursible costs.

29 ADMINISTRATION

Harshaw Chemical, in sudden break with tradition, decides to tell financial community and investing public the details of its story.

45 WASHINGTON NEWSLETTER

49 PRODUCTION

How does your company measure up to the industry-average ratios of supervisors to production workers to maintenance men?

59 SPECIALTIES

Fast-setting new glue gives Eastman

Chemical a means to enter adhesive market—if it so desires.

62 Du Pont offers formula for readily removable aerosol paints.

New report pegs nonfarm fertilizer at 10% of U.S. output.

67 Oct. 30 will be the final day on which to get your view on record as to the minimum wage levels for paint-plant employees.

73 RESEARCH

New fundamental studies of lithium catalysis may result in greater use of the metal as a polymerization aid.

83 TECHNOLOGY NEWSLETTER

87 ENGINEERING

Carbonate leaching is finding a greater use in uranium production.

95 MARKETS

Likelihood of magnesium oxide over-capacity becomes less ascertainable as market areas become more complex, forecasting more difficult.

103 SALES

Salesmen should show "more sincere interest in the buyer's problems," purchasing agent tells sales clinic.

111 MARKET NEWSLETTER

114 CW REPORT

Current trends in production and marketing of plastics presage bigger things ahead.

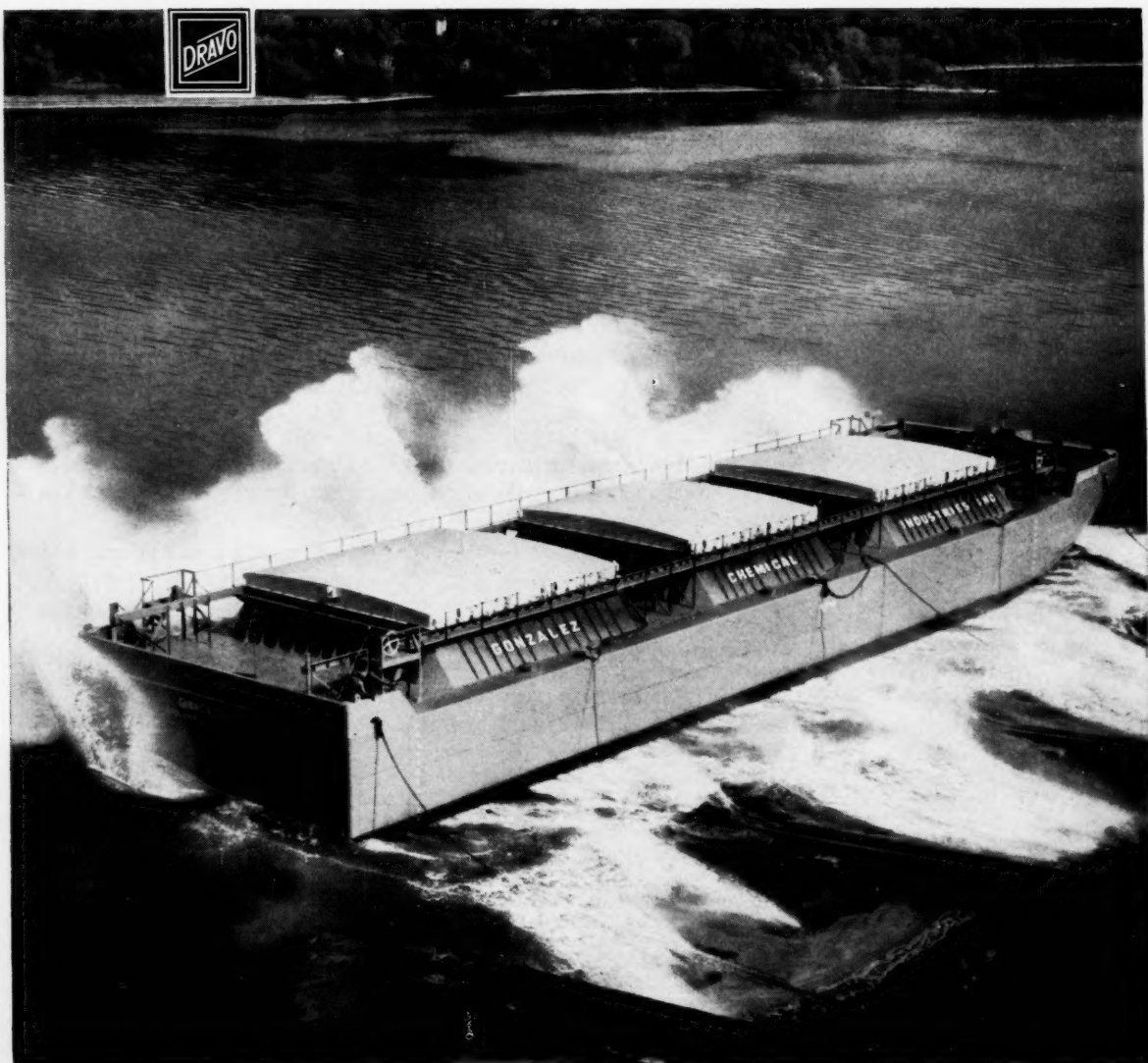
128 CHARTING BUSINESS

Latex paint sales show steady rise.

Vol. 81
No. 17

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Watch CW Grow — 38,434 copies of this issue printed



1500-ton fertilizer barges for Puerto Rico

Gonzalez Chemical Industries, Inc., uses two of these 177-foot barges to transport chemical fertilizers between Puerto Rico and neighboring islands. These welded steel barges were designed especially for this job.

Dravo hatch covers protect cargoes from weather and sea water. These watertight covers, equipped with quick acting clamps and adjustable rollers, readily expose up to 50% of the hatch area for speedy loading and unloading.

Towing characteristics were checked by model basin tests to assure performance. Careful engineering and design know-how gained through building more than 3,700 hulls qualify Dravo as a supplier of marine equipment for both deep water and river operation.

For information or consultation on your particular barge or towboat requirements, telephone SPalding 1-1200, or write to DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

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NEW AMP FLOOR WAX EMULSIONS



Cost Less!

A new method for using 2-Amino-2-methyl-1-propanol in floor wax emulsions, developed by CSC's Research Department, has opened the way for a greatly improved product. The new method consists of slightly reducing the AMP content and incorporating aqua ammonia. The result: wax with excellent water resistance which develops very rapidly after the wax film is laid down.

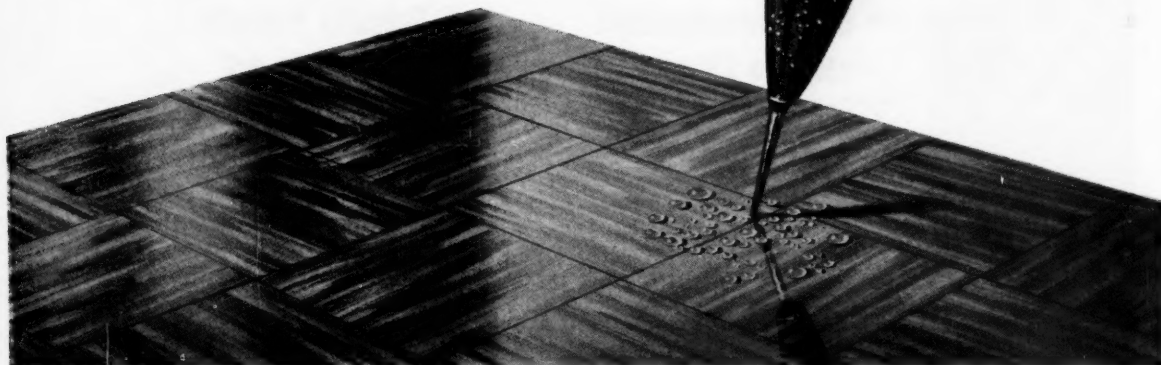
In addition to the rapid development of water resistance with the new AMP-ammonia formulations, considerable savings in costs may be expected since less AMP is required. Other performance char-

acteristics of the AMP-ammonia formulations such as shelf-life, freeze-thaw resistance, leveling, and gloss were fully equal to the best commercial formulations.

Proved By Performance Tests

In a series of tests, the new AMP-ammonia formulation attained "excellent water resistance" in less than *two-thirds the time* required, and at *one-third the cost* for amine when compared with a typical formulation using morpholine. A new technical datasheet describing these and other tests made with typical commercial formulations is available on request.

DISCOVER THE NITROPARAFFINS!



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LITTLE does *Anopheles Quadrimaculatus** know that tremendous forces are at work to cut short his and other insects' annoying, disease-spreading careers. For with each stroke of this 4000 ton press, another flat sheet of steel is accurately formed into the end of a tank car that might carry thousands of gallons of liquid insecticides to all parts of the country. This is one of the many giant-scale operations controlled with "watch-like" precision that make Shippers' tank and covered hopper cars the finest on the rails . . . Your assurance that the products you ship — liquid, powdered, or granulated — are safeguarded in transit.

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ALL SNARLED UP?

Selling lines can get complicated. Especially here in the Chemical Process Industries. So many plants, so many products, so many people — managers, production men, engineers . . .

Which end of the line do you grab to straighten out your own sales tangles?

Why not try your own end . . . *CPI-Management*? Management men in all functions . . . administration, production, plant operations — design and construction — research and development — sales and purchasing? Doesn't management say "Yes" or "No" on most forward moves your company makes? Most buying of new equipment and materials, for example?

You know it's no different with your best customers and prospects. So why not sell *CPI-Management*? Advertise, in force, to *CPI-Management*. And remember — you can reach, and sell, these men in the same magazine you, yourself, read . . . this fast-moving market's only newsworthy . . .
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...TO INFLUENCE CPI* MANAGEMENT IN ALL FUNCTIONS... ADMINISTRATION & PURCHASING,
PRODUCTION & ENGINEERING, RESEARCH & DEVELOPMENT



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functions for the news vital to
buying decisions ...

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in the CPI, concentrated for max-
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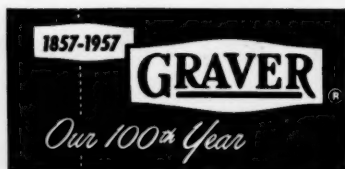
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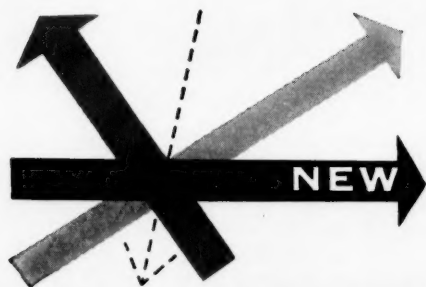
NEW MONUMENTS TO EFFICIENCY!

These huge stripper columns were produced with typical Graver craftsmanship. Shop fabricated from ASTM A-285 Grade C firebox quality steel, they represent one of many types of processing equipment Graver has been fabricating for 100 years.



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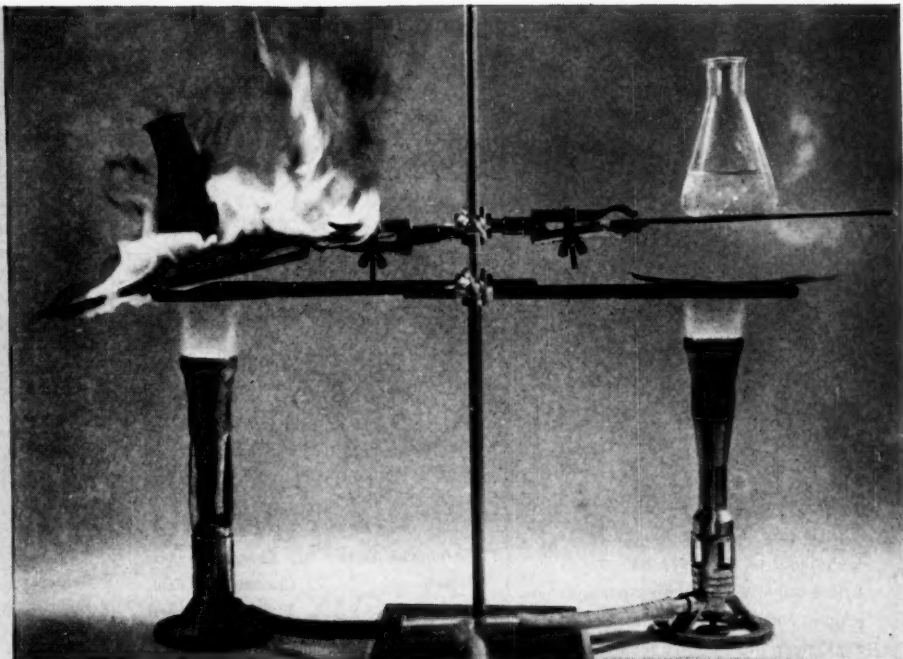


NEW PRODUCT DIRECTIONS

Dramatic Flame Test of Polyester Laminates For Heat Resistance

Acrylic-Modified Polyester Burns! (left)
Resin catches fire almost immediately — is entirely consumed in a few minutes.

TAC-Modified Polyester Stays Rigid! (right)
Temperatures well above 500°F didn't bend or burn this plastic sheet — water boiled in 12 minutes!



TAC FIGHTS HEAT—ADDS STRENGTH TO POLYMERS

Cyanamid's Triallyl Cyanurate widens processing and application possibilities

Outstanding high-temperature properties are contributed by the remarkably stable triazine ring of Cyanamid TAC to a wide range of polymer systems. In many cases, better pre-cure and curing processing techniques are possible. Some results obtained with Cyanamid TAC include:

HOMOPOLYMERS... heat-cure with peroxide catalysts to exceptionally hard, brittle, heat-resistant films with good optical and dielectric properties—and good adhesion to substrates.

ACRYLICS... modified with TAC are very hard and stable. Crystal-clear TAC acrylics with good optical properties are in commercial production.

EPOXIES... can be cured with TAC, thus providing greatly extended pot life.

TAC is a nonvolatile agent at commonly used curing temperatures, producing resins with high heat strength.

POLYESTERS... modified with TAC have the highest level of heat resistance, hardness and hot-strength known for this resin type.

VINYLS... Plastisols are plasticized by TAC to greater workability—produce

tougher, more effective films on curing.

POLYOLEFINS AND GR-S... TAC apparently cross-links with itself in certain systems to provide a "cage" structure which contributes rigidity and hardness to soft, flexible polymer types.

Use the coupon to obtain further information or a sample of this proved, economical monomer.



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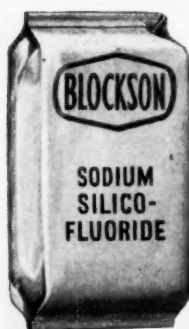
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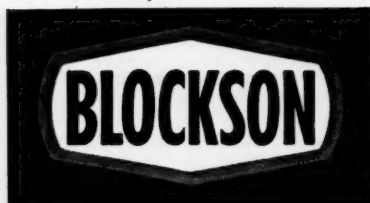
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OCTOBER 26, 1957

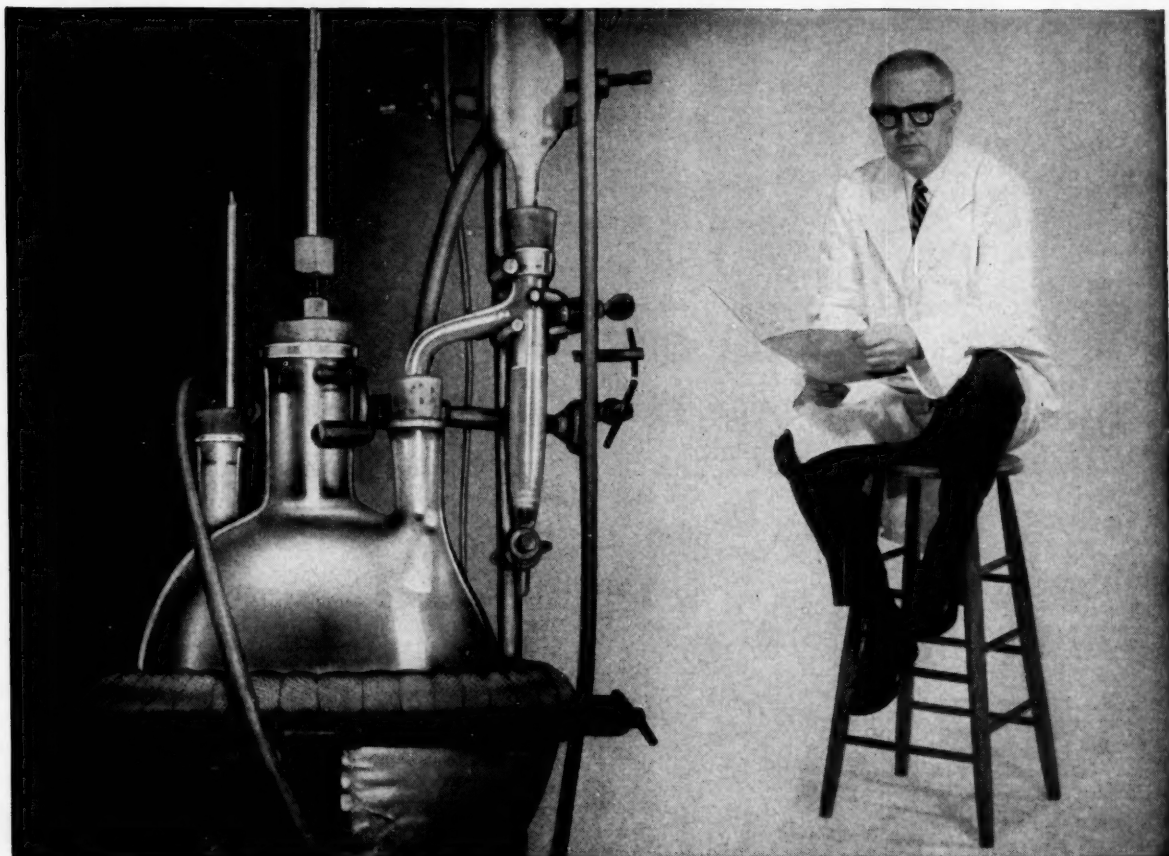
VOL. 81, No. 17

Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), founder, Executive, Editorial, Circulation and Advertising offices; McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Publications office: 1809 Noble St., Philadelphia 23, Pa. See panel below for directions regarding subscriptions or change of address. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice-President; L. Keith Goodrich, Vice-President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Joseph H. Allen, Vice-President and Director of Advertising Sales; A. B. Venezian, Vice-President and Circulation Coordinator.
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SPECIALTY RUBBERS—Copolymerize butyl acrylate with acrylonitrile to get hot oil and ozone resistant rubbers useful for tough gasketing applications.

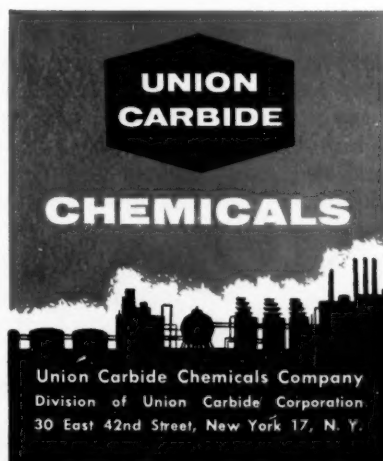
ADHESIVES—Homopolymers of 2-ethylhexyl acrylate are useful as adhesives and bonding agents.

TEXTILE FINISHES—Copolymers of vinyl acetate with higher acrylates are suggested for finishing cottons.

LUBRICATING OILS—Investigate copolymers of higher acrylates for viscosity index improvers and pour point depressants.

Applications don't stop here! A roundup of known and potential uses for the higher acrylates and ethyl acrylate, butyl acrylate and 2-ethylhexyl acrylate are described in—**ACRYLIC ESTERS (F-7434)**—For a copy write Union Carbide Chemicals Company, Department H, Room 328, 30 East 42nd Street, New York 17, New York.

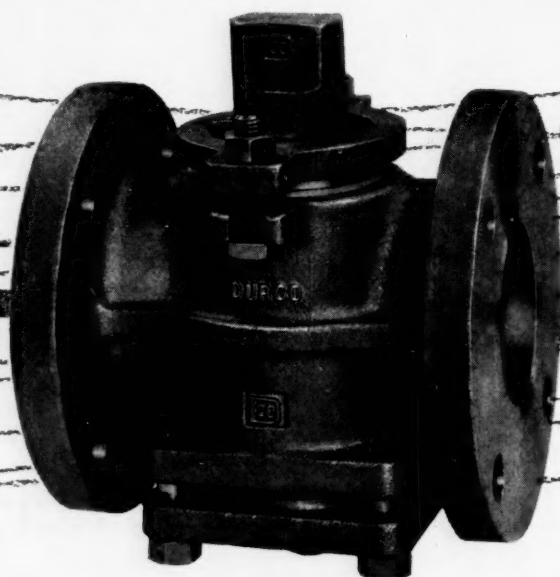
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SAVINGS

on maintenance run to thousands of dollars at
Michigan Chemical Corporation • Saint Louis, Michigan



DURCO TYPE F VALVE

Previous valves on a chlorinator manifold at Michigan Chemical Corporation leaked so badly they required daily re-packing. The leaky valves were replaced in 1952 by Durco Type F valves. These original Type F valves are still in service and they have "resulted in saving thousands of dollars by reducing operating down time and maintenance labor."

Michigan Chemical Corporation is a basic manufacturer of industrial, agricultural, and pharmaceutical chemicals, and is a leading producer of

insecticides, bromine, bromides (organic and inorganic) magnesia, salt, and rare earth oxides, compounds, and metals. The installation described here is just one of several Durco valve installations at its Saint Louis, Michigan, plant.

Durco chemical service valves, pumps, and other engineered equipment can probably save money for you.

For answers to your tough corrosion problems, write or call The Duriron Company, Inc., Dayton, Ohio.

DURCO TYPE F VALVES



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OPINION

Petrochemical Producers

TO THE EDITOR: We have reviewed your Petrochemical Report (Sept. 28).

As you know, we are producers of all types of aromatic and aliphatic solvents and are one of the biggest producers of 1° and 2° toluene as well as 5° and 10° xylene. We are also producers of ethylene and ethylbenzene and are looking into producing cumene and phenol. . . .

E. M. LUNDGREN
Eastern States Petroleum & Chemical Corp.
Houston, Tex.

TO THE EDITOR: Your list of manufacturers of styrene monomer (Sept. 28, pp. 58-59) omitted Foster Grant, which you know currently makes 70 million lbs./year and is expanding as fast as possible to over 100 million lbs./year. . . .

JOHN W. LABELLE
Director of Sales
Petrochemical Division
Foster Grant Co., Inc.
Leominster, Mass.

MEETINGS

Chemical Institute of Canada, Chemical Economics Subject Division; theme: Canadian Chemical Industry in 1962; Sheraton-Mt. Royal Hotel, Montreal, Oct. 29.

Federation of Paint and Varnish Production Clubs, 35th annual meeting and 22nd paint industries' show, Bellevue-Stratford Hotel, Philadelphia, Oct. 30-Nov. 2.

National Plant Food Institute, annual Southeastern fertilizer and soil fertility conference, Dinkler-Plaza Hotel, Atlanta, Oct. 31.

American Society for Metals, Second World Metallurgical Congress, Chicago, Nov. 2-8.

Fourth Pan-American Congress of Pharmacy and Biochemistry, Hotel Mayflower, Washington, Nov. 3-9.

National Paint, Varnish and Lacquer Assn., 70th anniversary meeting, Sheraton-Park Hotel, Washington, Nov. 4-6.

American Assn. of Textile Chemists and Colorists, 36th national convention, Hotel Statler, Boston, Nov. 14-16.

Chemical Market Research Assn., joint meeting with **Commercial Chemical Development Assn.**; theme: Gulf Coast Chemical Industry in 1965—A Forecast; Shamrock Hilton Hotel, Houston, Nov. 20-21.



Favor one druggist over all the others?

IF YOU DO, we'd guess it's because you have complete confidence in him—in the way he fills your prescriptions exactly . . . in his always-reliable, extensive, personal service.

As one of the largest suppliers of chlorine, Wyandotte is worthy of your confidence, too. Here's why:

Every step of the way—from basic raw materials to finished, delivered product—Wyandotte chlorine is under rigid supervision. That's just *one* phase of Wyandotte's technical service—a technical service that is a sincere, deep-rooted part of the Wyandotte philosophy of doing business.

Like your druggist, we believe in the importance of reliable service. We *want* your confidence.

To merit it, we guarantee your satisfaction with Wyandotte chlorine.

Tell us what you need in the way of chlorine . . . and we'll see that you get it the way you like it! Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.



Wyandotte CHEMICALS
MICHIGAN ALKALI DIVISION

For guaranteed satisfaction, buy Wyandotte Chlorine



ENGINEERS AND CONSTRUCTORS FOR INDUSTRY

385 Madison Avenue

New York 17, N. Y.

\$11 MILLION ETHYLENE OXIDE-GLYCOL PLANT UNDER CONSTRUCTION FOR CALCASIEU CHEMICAL CORPORATION

**Capacity to be 60,000,000 lbs./year of ethylene oxide or
8,000,000 gallons/year of glycol**

Utilizing the process developed by Shell Development Company, The Lummus Company has designed and engineered, and is now constructing an \$11 million ethylene oxide and glycol plant for Calcasieu Chemical Corporation at Lake Charles, La.

When construction is completed by Lummus early in 1958, the facility will be staffed and operated by 50 employees of Petroleum Chemicals, Inc. P.C.I. will also supply ethylene raw material to the new plant, from an adjacent ethylene unit designed and now under construction by The Lummus Company.

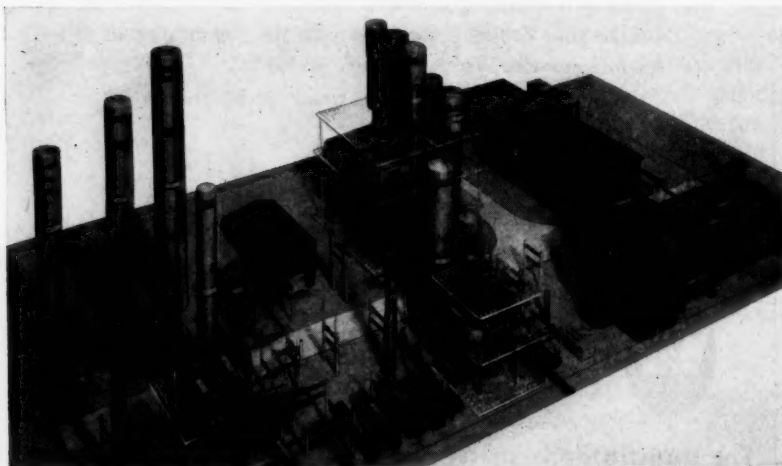
The Shell Process, which offers the advantages of unusually high yields and virtual elimination of the waste disposal problems encountered

in the Chlorohydrin Process, is conducted in two steps. The first step is direct catalytic oxidation of ethylene with oxygen in fixed bed reactors. Here ethylene oxide, valuable petrochemical intermediate, is produced for use by manufacturers of detergents and other surface active agents, plasticizers, solvents, textiles, drugs and many other petrochemical compounds.

The second step of the Shell Process calls for thermal hydration of ethylene oxide to ethylene glycol, essential to manufacturers of anti-freeze, explosives, plasticizers, fibers, resins, hydraulic fluids and many more chemical products.

This is the third ethylene oxide unit currently in construction by Lummus, based upon the Shell Process. For ethylene oxide and ethylene glycol, or for any type of chemical or petrochemical plant, Lummus' half century of world-wide experience is at your disposal.

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Caracas. *Engineering Development Center:* Newark,
New Jersey.



Model used by Lummus in engineering of Calcasieu Ethylene Oxide-Glycol Plant.

Business Newsletter

CHEMICAL WEEK
October 26, 1957

Considerable variation between this year's sales and profit and those of last year continues to show up in nine-month financial reports.

- Pennsalt Chemicals lifted third-quarter sales almost 16%, to \$20.6 million; but profits drifted down 19%, to \$641,056, compared with the '56 quarter. Nine-month cumulative sales for Pennsalt were \$61.4 million; cumulative profits, \$2.6 million.

- Union Carbide managed to increase profits and sales, although the sales gain was much greater than the profit increase. With \$355.5-million third-quarter sales, a 7% hike over the similar period of '56, Carbide has already passed the \$1-billion sales mark for this year. Quarter profits of \$34 million, up a bit more than 1% over last year, brought over-all profit to \$103.6 million.

- Papermaker Rayonier saw third-quarter sales slide 12%, profits plummet 65%. Quarter sales were \$29.3 million (\$33.4 million last year), and profits were \$1 million (\$3 million in '56). Nine-month cumulative sales are \$89.3 million; profits \$4.9 million.

- But National Distillers hiked sales almost 3% in the third quarter, and profits a solid 18%. Sales were \$127.7 million (\$392.6 million for all three quarters), profits were \$5.2 million (\$15.4 million cumulative).

Encouraging, too, are U. S. Dept. of Commerce surveys that show high cash dividends for nine months of this year. Chemical corporations have publicly reported cash dividends of \$646.1 million so far in 1957; the mark was \$612.7 million last year.

But contrasted with the nine-months profit picture is the chemical and allied industries failure picture for the same period. According to Dun & Bradstreet, 48 firms in that classification have failed in this three-quarter period, against 46 during the same period of last year. But dollar value of liabilities of the failures dropped from \$11.6 million to \$4.4 million for the first nine months of '57. (Texas City Chemicals' failure in '56 contributed some \$7.9 million to that liability mark.)

In the Pacific Northwest, Canada may be taking the play away from the U.S. At last week's meeting of the Pacific Northwest Trade Assn. in Tacoma, Wash., western-Canadian industrialists were far more optimistic, to say the least, about the growth prospects of their chemical industry. With an eye toward the Oriental markets, as well as the northwest U.S., Canadians see the "premium price" of the Canadian dollar, and the rich natural gas resources of their Western provinces as providing them with clear advantages.

Business

Newsletter

(Continued)

County right-to-work ordinances are creating confusion in California. The state supreme court will likely be called in to define the situation, which has been complicated by the fact that one superior court judge has just ruled one county's right-to-work ordinance legal, while only last July, another superior court judge had ruled another county's ordinance unconstitutional. (The state high court earlier ruled that municipal laws of this sort are unconstitutional.)

The Navy has delayed plans to seek bids for its shale-oil plant in Colorado. Questions about the Navy's title to the facilities at Rifle, Colo., caused the delay—both the Navy and the U. S. Interior Dept.'s Bureau of Mines claim jurisdiction. The Navy wants a private company to operate the unit (*CW*, Oct. 12, p. 44), and research carried on without federal funds.

Research has won a court victory in an air pollution legal battle involving 305 plaintiffs who sued U. S. Steel's Columbia-Geneva Steel Division for damaging cropland and cattle with fluorine from the plant's stacks. Federal District Judge Willis Ritter ruled total damage to stock amounted to only \$10,000-\$25,000 if the cattlemen turned the "damaged" stock in to the company. He threw out most of the cases brought by the 305.

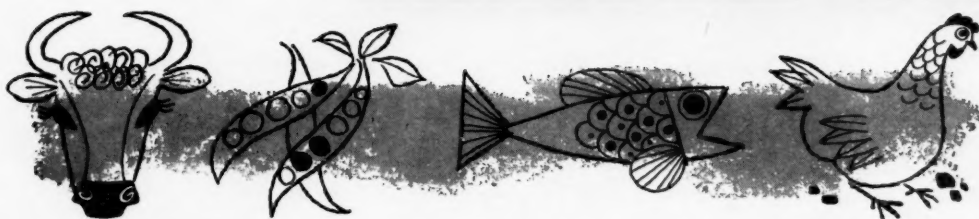
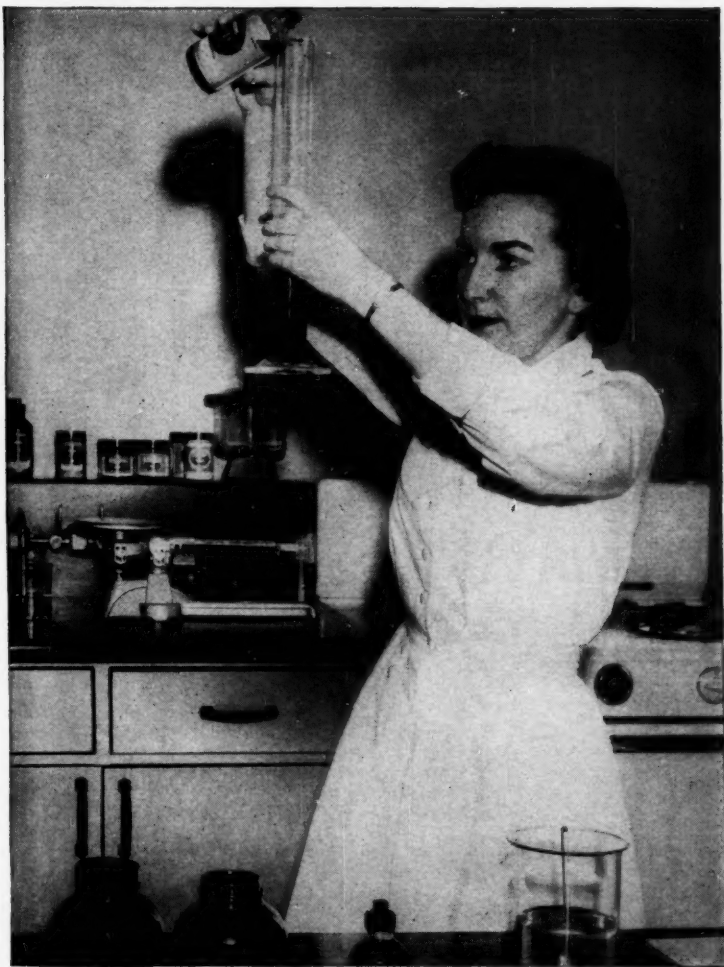
Suits arose when U. S. Steel, after installing a \$9-million electrostatic precipitator, stopped paying farmers and cattlemen a regular fee against damage. When the suits resulted, the company hired Stanford Research Institute to probe the toxic effect of fluorine on farm animals and vegetation. Utah State University did the actual checking of the cattle. Verdict: electrostatic precipitation effectively removed the element as an air pollutant.

If your company uses private radio facilities, or is eligible to use them, you have a stake in a major case that is now developing before the Federal Communications Commission.

FCC will decide, probably sometime in '59, whether to license industrial radio users for private microwave facilities. Industrial users are now allowed to use radio frequencies between 25 and 890 megacycles, but not microwave frequencies above 890 mc. Such frequencies are in almost infinite supply. Dow Chemical Co., through Special Industrial Radio Services Assn., has already asked FCC to make microwave licenses available to industrial radio users. Dow wants to use microwave both for voice communications and—more importantly—for telemetering and other process control functions.

In the next month or so, FCC will publish its own proposals on what to do about microwave facilities. After that, it will call for public hearings, which probably won't commence before early '58.

**new
ways to
improve
your
product
and
profits**



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The new booklet, "Huron HVP," will give you a wealth of information on specific applications of HVP in all phases of food processing. For your free copy, write, wire or phone Huron Milling Division, Hercules Powder Company, Wilmington 99, Delaware.

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*TITANOX is a registered trademark for the full line of titanium dioxide products offered by Titanium Pigment Corporation. ...

4790-A

October 26, 1957



Windscale reactor station, scene of 'world's worst peacetime nuclear mishap.'

In the Aftermath of Britain's Big A-Scare

What has been termed the world's worst peacetime nuclear mishap—last fortnight's disaster at Britain's Windscale atomic station—is raising some knotty public relations problems and some serious technical posers for processors concerned with civilian uses of atomic power.

The accident, in which an overheated reactor sprayed radioactive iodine-131 over an area of 200 square miles, is now being analyzed by reactor experts. Although reports from England are still sketchy, most agree that the near-calamity may well affect

nuclear labor and insurance costs as well as public acceptance of reactors in this country and abroad.

Repercussions: If it is determined that simple negligence was to blame, experts don't expect repercussions to be severe. But if—as some British sources have intimated—the accident was the result of an unexplained physical process, the implications are more serious. This much is known: The Windscale (Cumberland, England) reactor—a graphite-moderated, open circuit, air cooled model—had been shut down for routine maintenance.

On Oct. 10, workers noticed that its uranium slugs were heating up. In a matter of minutes the slugs were an ominous red; blisters formed on the metal's surface, and finally burst, shooting radioactive particles up Windscale's 400-ft. smokestack-like tower. The tower's filters trapped all solid matter (e.g., strontium-90), but iodine-131 gas spewed out of the stack and eventually blanketed an area of 200 square miles.

Cause Unknown: What caused the sudden surge of heat is a mystery. The seven-year-old nuclear reactor was



Radioactive milk from 200-square-mile area is dumped.

shut down when the overheating took place. This may mean, say British nuclear scientists, that some new and obscure nuclear mechanism has asserted itself.

On the other hand, both British and American scientists agree that it could have been a result of "after-heat," a common phenomenon in reactors that are shut down after long use.

The Local Scene: The high iodine-131 level in the immediate area is not decaying as fast as the British Atomic Energy Authority had anticipated. The plant is surrounded by cattle grazing land—Cumberland is a dairy center of England. Cattle are "vacuum cleaners" for radioactive particles, concentrate them in their bodies. Consequently, all milk produced within 200 square miles of the reactor has been declared unsafe and has been barred from shipment, and dumped.

In addition, reporters on the scene say the British faith in Atomic Energy Authority statements has been shaken. Early reports, from Edwin Plowden, head of the AEA, were designed to avoid panic. They implied there was no danger. But later reports contained conflicting statements, extended the original area of contamination from less than 25 square miles to 200.

U.S. Views: In this country, AEC is concerned about a possible—though perhaps unjustified—decline of prestige as a result of its British counterpart's incomplete explanation of the mishap.

Another U.S. reaction comes from the group of unions headed by the United Auto Workers of America. The UAW strongly opposes installation of Power Reactor Development Corp.'s \$43.2-million reactor at Monroe, Mich., on the grounds that safety techniques aren't adequate (*CW*, May 25, p. 25). It's certain now the unions will use the Windscale incident as ammunition. UAW's attorney, Leo Goodman, of Washington, D.C.—after learning of the accident—said "the PRDC hearings won't be the end of it. We'll take this to the courts."

Relative Safety: But reactor men point out that the Windscale reactor is an open-circuit type, cooled by a stream of air. This is an older model, different from the PRDC reactor, and different from most now being produced. Somewhat similar types are at Oak Ridge, Hanford and Brookhaven laboratories in this country, but all have been operating safely for several years and have "modern" safety features. The Calder Hall reactor, adjacent to the Windscale installation, reportedly couldn't have produced such a mishap, either, because it is gas-cooled and a closed-circuit type.

As yet there is no complete, authoritative information on the safety of different kinds of reactors. Each type, whether it be gas-cooled, air-cooled, open-circuit or closed-circuit, has advantages and disadvantages and each must be judged on its own special characteristics.

British Fusion Progress

While some British atomic officials were worrying over reactor mishaps (p. 21), others last week were happily disclosing atomic research progress made by British scientists.

At Columbia University's Arden House conference on "Atoms for Power," Sir John Cockcroft, of Britain's Atomic Energy Authority, told listeners that encouraging results have been obtained in the authority's experiments with atomic fusion. He pointed out that the experiments have been under way for approximately two months.

In the British tests, a device called a zeta apparatus has produced temperatures of well over a million degrees and maintained them for thousandths of seconds rather than millionths, the best previously attainable times. This has been enough to produce fusion of deuterium and tritium in a tube.

Now, the AEA tells *CW*, it will be ready to release official results of the experiments in about 10 days. And AEA sources say they are now absolutely certain of an academic breakthrough in the fusion field. They say, further, that temperatures produced are probably close to 2 million degrees centigrade—although the official figure is 1 million degrees.

Industrial Outlook: But the British hasten to point out that the day of industrial significance of the experiments is still a long way off. Cockcroft reiterated that more conventional fission reactors still "have a long and useful life."

"In the United Kingdom," he said, "we expect nuclear power to cost approximately 10% more than coal power in 1960, to reach parity about 1963, and to be about 30% cheaper than coal power by 1970."

Also last week, delegations of British and American scientists met in secrecy at Princeton, N. J., to exchange information on progress in the fusion field. Though Cockcroft, who heads the delegation, was not present at the time, Peter Thornemann, director of the Harwell reactor station, refused to confirm the fusion breakthrough.

But he pointed out that the British feel they're moving more rapidly toward their goal than had previously been expected.



PRESS PICTURE SERVICE

ICWU President Miller (right) welcomes OCAW President Knight.

Union Convention Winds Up

A modest increase in militancy on the part of International Chemical Workers Union (AFL-CIO) and other chemical labor unions is in prospect ICWU's 14th annual convention, held in Detroit last week.

this week as the result of actions at

Delegates to the convention shouted down the proposal—strenuously urged by ICWU President Walter Mitchell—to boost the union's bargaining power by levying an extra 50cs/member/-month to build up a \$250,000 "strike fund." Instead, they adopted a compromise plan that calls for an allocation of some \$90,000 from the union's existing "defense fund" to set up a new strike fund that will be maintained by a 25cs increase in the monthly per-capita tax.

Added to the package is a strike manual (yet to be written) to guide locals in when and when not to strike, and also how to conduct one effectively once it is started.

Despite this partial personal defeat, Mitchell will go ahead with his plan to invite other unions representing chemical workers in the U. S. and Canada to take part in a collective bargaining conference for the entire chemical industry. He said it should be held soon to discuss framing joint policy on such matters as guaranteed wage

programs, shorter work week, and seniority.

Holdovers: A vast amount of routine business left over from last year's stormy convention was disposed of between speeches by visiting dignitaries.

O. A. "Jack" Knight, president of Oil, Chemical & Atomic Workers, talked on the mutual goals of the two unions, but avoided direct mention of any merger between the two. Bureau of Labor Standards Commissioner Ewan Clague warned that if wages are to go up, it must be hand in hand with increased productivity—in not just one industry, but in most industries.

An eagerly anticipated talk was that by Kenneth Towe, newly elected board chairman of the American Cyanamid Co. Towe hinted that industry-wide bargaining contains a flaw—that wage increases demanded on the basis of the most successful producer's profit picture could easily drive marginal operators out of business.

Another speaker was Walter Reuther, chief of the United Auto Workers and a vice-president of the AFL-CIO. Reuther received an ovation when he lashed out at union corruption.

Partners in Metals

Koppers Co. and Strategic Materials Corp. last week joined forces to accelerate the development of Strategic's electrochemical process for making ferromanganese. Strategic's process, thought to be a significant step forward in converting low-grade ores into suitable starting material for ferromanganese production, has been in prototype operation for some time (CW Technology Newsletter, Jan. 26).

Koppers will perform a number of services for Strategic Materials:

- Pick up an indefinite amount of Strategic's common stock at \$17.50 a share (now selling over-the-counter at about \$14 bid, \$15% asked).
- Help pay operating costs of Strategic's prototype plant and its subsidiary research organization.
- Provide additional personnel for both operations.
- Make engineering designs and construction and operating cost estimates for the commercial ferromanganese project Strategic hopes to build.
- Help negotiate contracts for the product.

For Strategic Materials, the deal is a particularly good one. On the surface, at least, it appears to ensure the company sufficient operating money to refine its process, will also permit Strategic to pick up full ownership, patent rights and properties of Strategic-Udy, the key company involved in the process development. Until now, Strategic Materials has owned some 80% interest in the subsidiary, with Strategic-Udy founders Robert Denman and Marvin Udy holding the rest.

Koppers, in supporting the deal, apparently is staking a good bit of cash. But, besides picking up work for its construction division, Koppers' acquisition of partial licensing rights to the process will put it in an excellent position to sell similar plants to the steel companies for which it builds equipment.

Strategic's board chairman Samuel Lunt says the deal includes processes for ferromanganese, ferronickel and ingot iron from laterite ores, ferrochrome from low-grade chromite ores, iron and alumina from off-grade aluminum ores, and pickle liquor recovery. He says also that the ferromanganese process has been sufficiently evaluated to be declared an economic as well as technical success.

Depletion Windfall

U.S. Supreme Court last week made its first decisions on just what cases it will or will not handle this term (*CW*, Oct. 19, p. 33). Three have special significance for the chemical process industries.

- The court, in effect, endorsed (by refusing to review) a lower-court ruling that permits application of the so-called "depletion allowances" to the computation of taxes for a broad range of mining activities.

- The tribunal will clarify the "hot cargo" clauses of labor contracts. Prime issue—how far can a union go in trying to enforce contracts that allow workers to refuse to handle "unfair" goods ("hot cargo") of another employer?

- Left standing is a lower-court decision that the federal courts have no jurisdiction, under the Taft-Hartley law, to enforce collective bargaining agreements that call for arbitration of differences arising in new-contract negotiations.

Pumping up Profits: As a result of the depletion ruling, cement companies are already revising upwards their estimates of '57 earnings. Application of the depletion allowances to their holdings of cement rock* can mean a tax adjustment worth millions—e.g., a windfall of \$1.4 million for Calaveras Cement; nearly a \$2.5-million refund (on taxes paid 1951-1955) to Dragon Cement Co., division of American-Marietta. A-M's '57 savings in all divisions may be about \$1.5 million.

Treasury Dept. believes the ruling will cost the government over \$133 million in tax refunds, and an annual revenue loss of \$88 million. It will doubtless press for legislation next session to clearly limit depletion allowances to purely mining operations and specifically exclude coverage of income from related processing activities.

Hot Question: In taking up the matter of "hot cargo," the Supreme Court will resolve whether a union can legally include "hot cargo" clauses in their contracts or whether such clauses produce the effects of a secondary boycott. The court will also determine how far a union may go in enforcing such clauses.

The National Labor Relations

*Brick and tile makers, too, may be able to take advantage of the depletion allowances—and some authorities think that the allowances cover sand, gravel, granite, coal, bauxite, borax and sulfur.

Board has long permitted the clauses (common in contracts with the Teamster's Union), but has argued that the union violates Taft-Hartley if it appeals directly to employees to abide by the agreement. Unions hold that since the agreement is legal, a union appeal to the workers is the only practical method of enforcement.

Costs Reappraisal

Defense suppliers may soon have a more closely defined set of rules by which to charge their costs in future contracts. A new set of armed services procurement regulations clearly details expenses a contractor can charge to the government.

Seen by some industry people as a "tightening up," the new rules cover an exhaustive list of chargeable items—e.g., cost of patents, pension

plans, professional services, advertising, bonus plans, depreciation. Moreover, the rules will be identical for all the services, will apply to both fixed-price and cost-plus-fee contracts and will be used to determine allowable expenses when any contract is cancelled.

But Defense Dept. officials don't go along with the "tightening-up" theory. In some cases, they say, costs will be liberalized. They also point out that rules on allowable costs have been vague and some military procurement officers have applied them more stringently than others.

The Defense Dept. maintains that the changes are meant only to "clarify and define" procurement regulations.

After review by trade associations representing defense contractors, the 42-page revised list of allowable costs will be available at the Pentagon.



Japanese Return After 25 Years

A chemical process firm last week was involved in the first sale of Japanese securities in the United States in over 25 years. The firm is Alaska Lumber and Pulp Co., Inc., a subsidiary of Alaska Pulp Co., Ltd., which is owned by Japanese rayon and paper interests.

The Japanese* sold \$12 million of

first-mortgage sinking-fund 6% bonds, Series A, due Dec. 31, 1976. Dillon, Read & Co. negotiated the sale to a number of insurance companies and investment funds.

Proceeds from sale will be put toward the \$55.5-million pulp mill the firm is building in Alaska. Another \$7 million will be raised by sale of other securities, while remaining capital will be provided by the parent concern.

*Left to right, Yasuo Niki, Alaska vice-president; Tadao Sasayama, Alaska president; Frederic Brandt, Dillon, Read president; Arthur Wadsworth, Dillon, Read vice-president.

How to make Vinyl Foam without special equipment...

Use Du Pont BL-353 Blowing Agent

To stimulate your inventive mind, here are just a few typical examples of the wide variety of products being made from vinyl expanded with Du Pont BL-353.

Du Pont BL-353 is a chemical blowing agent. For ability to produce expanded vinyl with a wide range of physical properties it has no equal. Here are a few of the many advantages you can derive from using this general purpose blowing agent:

No Special Equipment

With Du Pont BL-353, low density vinyl foam can be made at atmospheric pressure without any special equipment.

Can also produce Cellular Vinyl

BL-353 is equally well suited for producing cellular vinyl, in which, unlike vinyl foam, the cells are not interconnected.

Wide Range of Properties

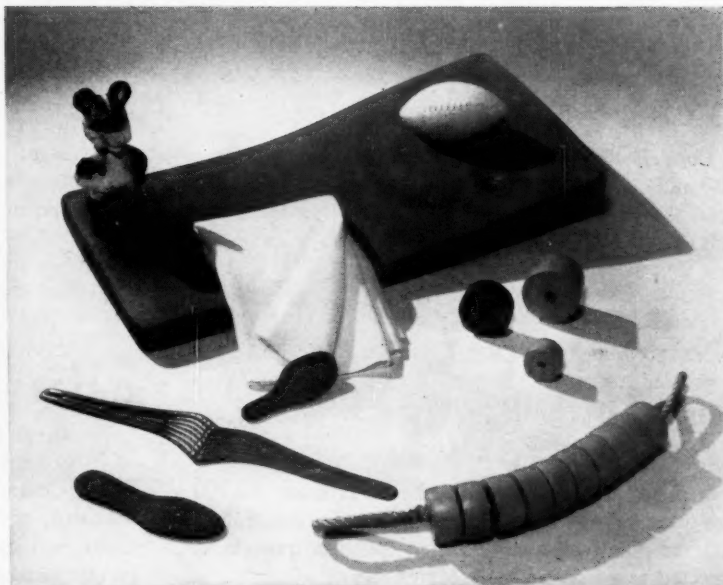
With only slight variations in the formulations and processing conditions, vinyl foam or cellular vinyl can be obtained in a wide range of physical properties—from rigid to soft and resilient, and in densities ranging from 2.5 to 35 lbs. per cu. ft.

Uniform Cell Structure

BL-353 produces vinyl foam and cellular vinyl with fine, uniform cells in either thick or thin sections. With dielectric heat for fusion and curing, vinyl foam slabs up to 6 inches in thickness can easily be produced.

Variety of Colors

Foam in a variety of colors (including snowy white) can be made with BL-353 because it imparts no color or odor to the resin.



CELLULAR VINYL OR VINYL FOAM—Both types of expanded vinyl can be made with Du Pont BL-353. Pictured above, approximately $\frac{1}{12}$ actual size, are products made of both types in a wide range of physical properties. The slab cushion, fish net floats and boat fender are of cellular vinyl (all by Linen Thread Co.). The thin sheet and belt (Crest Chemical Industries Corp.) and the two children's toys are made of vinyl foam. The shoe soles (Foam King, Inc.) are made of both cellular vinyl and vinyl foam.

WRITE FOR BULLETINS, SAMPLE

Two bulletins which give complete data on BL-353 from chemical composition to uses and availability, are yours for the asking. Ask for a sample too, for testing in your own production equipment. Write to E. I. duPont de Nemours & Co., Inc., Chemical Sales, Explosives Dept. MPE, 2543 Nemours Bldg., Wilmington 98, Del.

DU PONT BL-353

CHEMICAL BLOWING AGENT



REG. U.S. PAT. OFF.

Better Things for Better Living . . . through Chemistry

FOREIGN

Chemicals/India: Three new Indian steel plants, due to be completed by '59, will be chemicals producers.

At Rourkela, where a German firm is building a steel mill, production will include light oil, carbolic oil, naphthalene oil, anthracene oil and pitch. In addition, the plant will make phenol, cresol and xylol. Nitrogen will also be produced.

A Russian installation at Bhilai will produce ammonia, ammonium sulfate, benzol, toluene and xylene; a British-built plant at Durgapur will make road tars and creosote.

EXPANSION

Copper: Kennecott Copper Corp. plans to build a \$20-million electrolytic copper refinery in Anne Arundel County, Maryland. Initial capacity is rated at 7,000 tons/month; startup is scheduled for '59.

Lithium: Quebec Lithium Corp. has taken options on 450 acres near Rouses Point, N. Y., as a site for a lithium refining unit. Raw material: oxide shipped from a mine near Val d'Or, Que. The mine's mill produces more than 1,000 tons/day of oxide.

Superphosphate: Stauffer Chemical Co. will build a new plant at Richmond, Calif., to produce 50,000 tons/year of pelletized superphosphate. To cost \$350,000, the plant will use a Stauffer-developed process, is expected to go onstream in March '58.

Carbon Black: Commercial Solvents Corp. will expand its pelleted carbon-black facilities to more than double present capacity. A new process reportedly will be used. Full-scale production is due in the first quarter of '58.

Refinery Chemicals: Canadian Oil Companies, Ltd., will spend \$8 million to expand its Sarnia, Ont., refinery. Capacity will be boosted to 50,000 bbls./day. First phase of construction calls for a \$4-million 20,000-bbls./day crude distillation unit to be built early in '59. Completion date: '61.

Uranium: Geo-Resource Corp. has discovered new uranium deposits in Spokane, Wash., near the Spokane Indian Reservation. The deposits, verified by the Atomic Energy Commission, reportedly have a uranium content of 0.13% to within 4 ft. of the surface. Authorities, however, are still uncertain about the importance of the new discovery in relation to existing U.S. uranium reserves.

Pulp and Paper: Champion Paper and Fibre Co. is planning a \$20-million expansion of its mill in Canton,

N. C. The expansion, say Champion officials, will make the Canton mill the largest bleached pulp and paper mill in the world.

On completion, the Canton mill will have a total of eight machines capable of producing 1,000 tons/day of paper and board in addition to a bleached pulp mill with a capacity of 1,100 tons/day.

A new high-speed paper machine will be in operation by April '59, with other capacity-boosting facilities slated for earlier completion.

Oil-Petrochemicals: Canadian Oil Co., Ltd., is blueprinting an \$8-million expansion of its refinery near Sarnia, Ont. Plans call for a boost in crude oil capacity to 50,000 bbls./day from the present 30,000 bbls./day. The program is slated for completion by '61.

Gypsum: U.S. Gypsum Co. is completing plans for a "multimillion-dollar" gypsum plant in Galena Park, Tex. The new unit will turn out sheet rock gypsum wallboard, rock lath, plaster base, plaster and gypsum sheathing for sale to Texas Gulf Coast consumers. Tentative completion date: early '59.

COMPANIES

Pittsburgh Plate Glass Co. has transferred operation of its Columbia Cement division's plant in Zanesville, O., to Columbia-Southern Chemical Corp. Columbia-Southern, a wholly owned subsidiary of Pittsburgh Glass, will operate the plant with no changes in sales or management policies.

Morningstar, Nicol, Inc. (New York) has acquired Federal Adhesives Corp. (New York), reportedly through a cash transaction. The merger, under discussion for several months, was completed last fortnight. Included in the transaction are all subsidiaries of Federal, including Federal Latex Corp., makers of rubber latex compounds, and Federal Chemicals Corp., producer of industrial chemicals and vinyl plastisols. Federal and its affiliates will continue operating as wholly owned subsidiaries of Morningstar, Nicol.

Reichhold Chemicals Inc. (White Plains, N. Y.) plans to sell 200,000 shares of its common stock in a public offering. The company will use about \$3.5 million of the proceeds for its construction program with the remainder to be added to working capital reserves.

West Virginia Pulp & Paper Co. will acquire all the assets of Virginia Folding Box Co. Inc. (Richmond, Va.) through an exchange of stock. Terms call for Virginia Pulp to exchange 155,000 of its common shares for all the outstanding stock of the Richmond firm. At current market prices, the deal would involve about \$5.5 million.



BIG EVEN FOR TEXAS

Four giant towers of the Phillips Petroleum Company's Natural Gas Liquids Fractionating Unit #10A rise over the Texas prairie. It is one of the largest units of its kind in the world.

A unique infra-red and differential refractometer analysis system developed by Phillips provides continuous product and quality control. Stone & Webster Engineering Corporation performed the detailed engineering, design and construction of this unit utilizing process information supplied by Phillips.

Stone & Webster designs and builds all types of installations, both large and small, for process industries all over the world. Write or call us for information as to how our experience may be of assistance to you.



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Take a good look at Continental's exclusive line of five Fluid Flow cans. Everyone of these rugged containers gives liquid-smooth performance for your detergent *plus* these big selling features:

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WRAP AROUND LITHOGRAPHY. Solderless construction frees every square inch of outside surface for colorful decoration—even domes and tops.

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TOP PRODUCT PROTECTION. Newly-developed enamel linings prevent raw metal from touching your liquid detergent.

For more information on how Fluid Flow cans can benefit your product call your nearest Continental representative.

News For Makers Of Other Hard-to-hold Products

Fluid Flow cans are also available for such products as: liquid wax (water base) . . . liquid soaps . . . liquid starch . . . liquid car wash . . . liquid polish (water base) . . . liquid rug and upholstery cleaners . . . and water base cleaners.



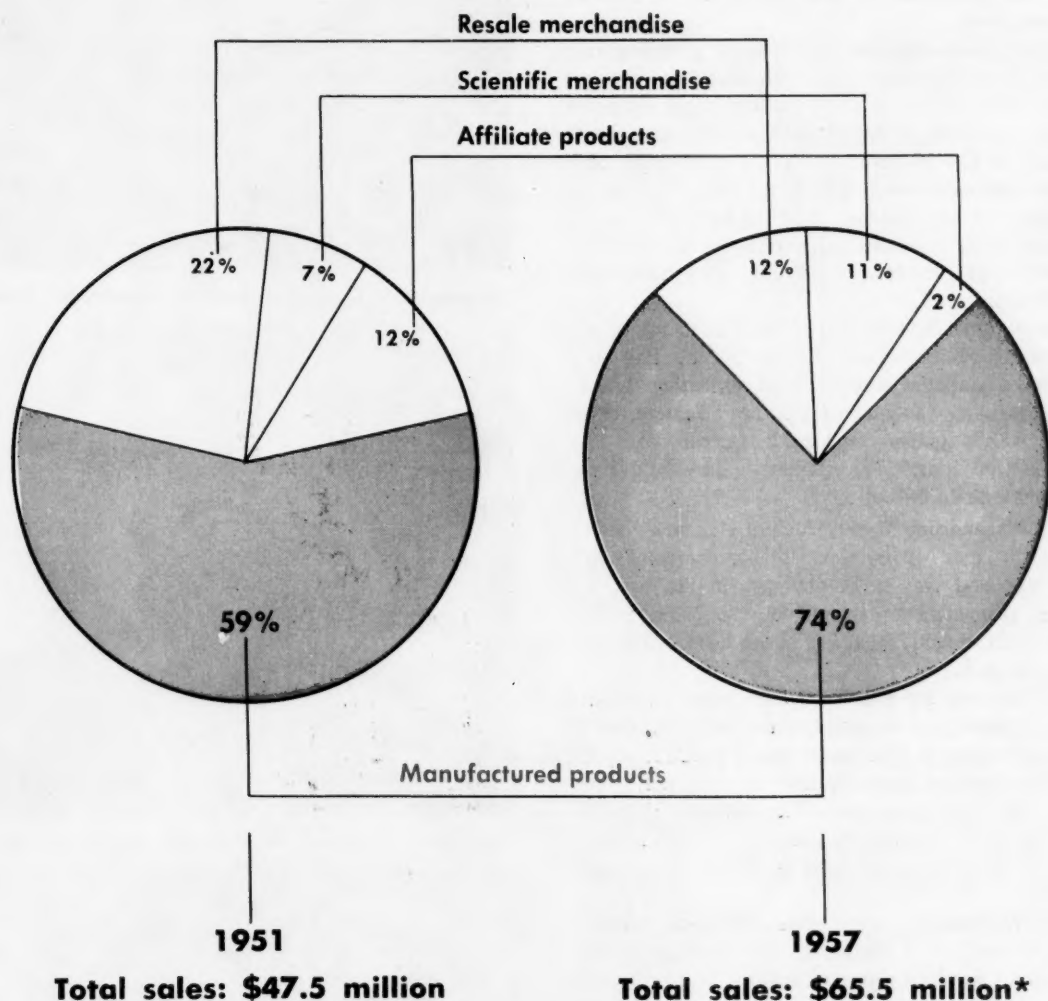
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ADMINISTRATION

New stress on

'We make it ourselves' in Harshaw operations



*Projected from nine-month results.

At Harshaw: A Sharp Break with Tradition

Next month in Cleveland and the following month in New York, two Harshaw Chemical Co. executives—A. Deane Perry, director, vice-president and treasurer, and George Whitaker, assistant to the president—will take the first concrete steps in a specialized public-relations program that represents a sharp break from the 65-year-old company's long tradition of reticence.

Factors behind the recent decision to start beaming

the Harshaw story to the financial community and the investing public—beginning with security-analysts organizations in those two cities—are not unusual in the chemical industry. Essentially, there are three common reasons for wanting the price of a company's capital stock to ride along at reasonably high level:

- To keep shareholders happy.
- To maintain a good jumping-off platform for pos-

ADMINISTRATION

sible future stock offerings the firm may wish to make.

- To be in a strong bargaining position for any possible future merger based on exchange of shares.

Quick Action Wanted: But in Harshaw's case, a certain urgency attaches to some of those factors, which helps to explain the relative suddenness of the new move. And it's of interest to note the "how" in this company's first flyer into the 20th-century art of blowing one's own horn.

Among present shareholders, there's a feeling that Harshaw stock is underpriced, even taking into account the big over-all drop in stock market prices since the 1957 peak in July. What disturbs them is that shares purchased at \$34-36 during the spring of '56 (right after Harshaw common was listed on the New York Stock Exchange) are now trading at about \$21. This is less than nine times per-share earnings, whereas for many chemical stocks the price-earnings ratios have been more than 20 to 1.

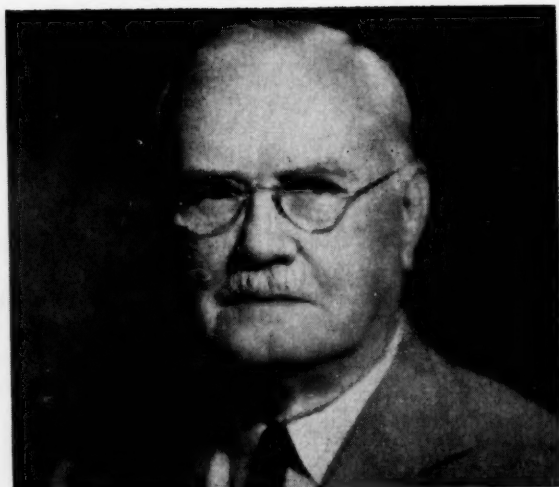
Harshaw officers insist that no new financing or acquisition is now in the cards, but concede that they like to keep prepared. Perry will go no further than to say that Harshaw "might in the future be interested in merging with a smaller company that fits into our picture." Then, he adds, "We certainly would want to have a reasonable price on our stock."

The Merchandising Myth: Much of Harshaw's manifold growth since '40 is related to the company's five acquisitions and two stock offerings in the past 17 years. A management can scarcely be criticized for looking again to tactics that have been used so successfully in the past.

One of the first big goals in the new tell-folks-about-Harshaw campaign is to puncture the persistent notion that this company is little more than a peddler, a jobber of the chemical products made by others. It's true that for the first three years after William Harshaw (at the age of 32) founded the concern in 1892, it functioned only as a buyer and seller of chemicals, oils and dyes.

But in '95, Harshaw made plans to become a manufacturer as well as a merchant. He obtained a part interest in a Cleveland glycerine refining firm, a linseed oil mill at Elyria, and a company producing nickel salts and anodes for use in electroplating. His Cleveland Commercial Co. was sales agent for all these concerns. Since then, manufacturing has accounted for an increasing share of Harshaw operations. This trend is still going strong (*see chart, p. 29*).

Supermarket Style: Harshaw's aim was to be able to provide all the chemical requirements of an industry, either by manufacture or resale, he didn't relish the idea of letting his customers do part of their chemical shopping elsewhere. To some extent, this same policy is carried out today. For example, a company doing electroplating work can procure from Harshaw not only nickel anodes and salts but also boric acid, muriatic



Founder William Harshaw: A trader at heart.



Chairman Harshaw: He's in the lab every day.



President Parke: Production man since 1919.



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	Relative Viscosity				
	Initial Day	5th Day	10th Day	30th Day	50th Day
With DOP.....	0	135	210	305	340
With Secondary Plasticizer A.....	0	55	65	85	90
With PANAFLEX BN-1..	0	45	55	65	70

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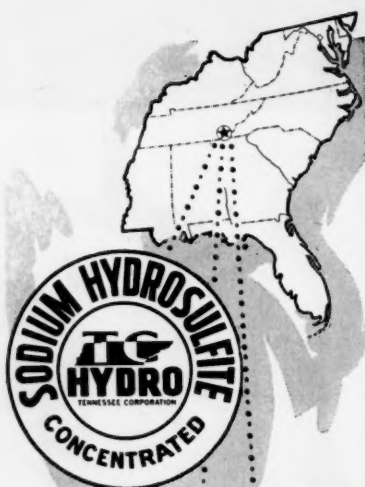
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ADMINISTRATION

acid, sulfuric acid, alkaline cleaners, filter charcoals and other chemical needs.

A few years later, the company began the manufacture of sodium fluoride and ammonium fluoride, and next started making cobalt oxide and cobalt salts—the former used mainly in preparation of ground coat enamels for steel, the latter to make improved driers for the paint and varnish industry.

In the '20s, Harshaw built a new hydrofluoric acid plant, also began making cadmium products—mainly cadmium lithopones. It also started a line of color oxides for the ceramics industry.

Research to the Fore: Another detrimental myth that Perry and Whitaker hope to demolish over the coming months purports that Harshaw is a nonentity in research. In dispelling that misconception, they can point to the fact that their chairman of the board—W. J. Harshaw, son of the founder—is a researcher at heart, was the company's first research director.

This leads to the observation that each of the three men who have presided over the company has specialized in a different aspect of the business (see pictures, p. 30). While the founder launched the company's manufacturing and research operations, he was primarily a trader. His "trader's instinct" is seen in his no-cost headquarters scheme: he rented an office in Cleveland for \$5/week, but let the Fish Dealers Assn. use the office on Saturday afternoons for the same amount.

His son's first job with the company (after earning his degree in chemical engineering at Yale and McGill) was in production, but his call was to research. He has authored more than 20 patents in chemical products and processes, which were assigned to the company; and he still shows up at the laboratory nearly every workday.

Charles Parke, who's now in his second year as company president, is essentially a production man. He studied mechanical engineering at McGill, served in the Canadian army during World War I, then joined Harshaw as head of engineering at the Brooklyn, O., plant. He became superintendent of the company in '36, a director in '39, vice-president in charge of manufacturing in '40, and executive vice-president in '50.

Harshaw's research spending has increased 40% during the past two years—not including capital expenditures for new research facilities. This year's annual report numbers the research and development staff at more than 170 scientists and technicians—nearly 10% of all employees.

Girls' School Conversion: Harshaw research dates back to '30, when the company moved into its present headquarters on Cleveland's east side. The site previously had been the campus of Hathaway-Brown School, a fashionable academy for girls, and the gymnasium was converted into a research laboratory.

One of the first products to come out of this lab was a new process for putting a bright polish on nickel surfaces. This saved the auto companies millions of dollars in buffing costs. Later came uverite, a tin oxide substitute that could be made and sold at half the price of tin oxide and proved just as efficient as a mill addition in the manufacture of vitreous enamelware. Next out: several new ceramic colors, glass enamels and improved cadmium colors.

In '35, the company began work on the problem of producing anhydrous hydrofluoric acid, and the first tank car of this chemical ever shipped left a Harshaw plant in '42. Then came new processes for making ammonium bifluoride and improved methods of producing boron trifluoride. In '41, the company was asked to produce a small amount of uranium hexafluoride; this led to construction of a plant for UF₆ production for the atomic bomb project. Under Whitaker's direction, this plant turned out the first 100 lbs. of that heavy gas ever produced.

Whitaker—who headed that plant—will probably be doing most of the talking before the Cleveland and New York analysts. A Harshaw veteran with research, production and administrative experience, he was chosen for the precedent-breaking appointment as Harshaw's first public relations officer on the basis of his thorough knowledge of the company's operations. The immediate aim is not to set off a high-pressure publicity barrage on behalf of the company, but rather to provoke the interest of investment men in Harshaw common stock—a security that hasn't skipped a dividend in more than 20 years.



News from

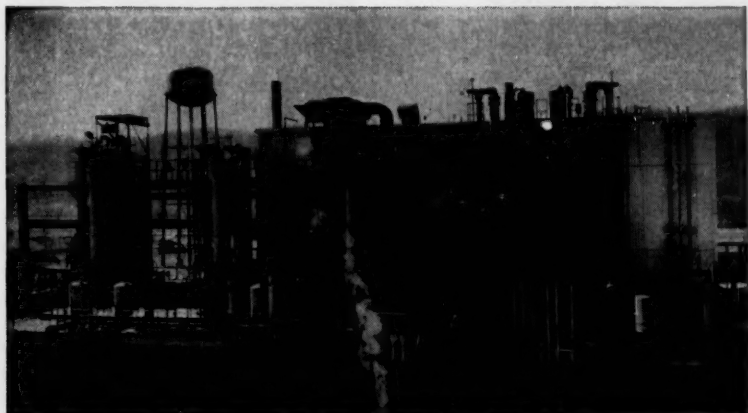
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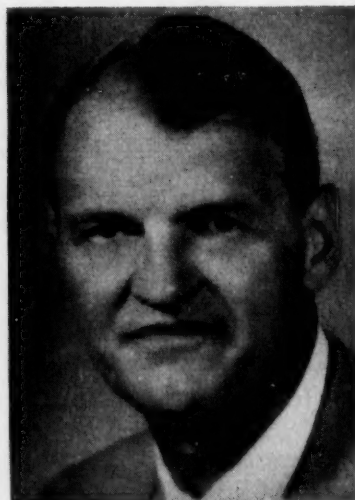
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ADMINISTRATION



WIDE WORLD

Judge Brooks: Who has rights to oil under the Ohio River?

LEGAL

Oil Lease Suit Dismissed: One of several lengthy suits attempting to determine who has authority to lease oil rights under the Ohio River has been dismissed in U.S. district court at Owensboro, Ky. A similar case is pending in Henderson, Ky., circuit court.

The dismissed case—which has been through several courts since it was instituted about three years ago—was remanded to the lower court by the U.S. circuit court of appeals (Cincinnati), with orders to dismiss.

During the first phase of the litigation, U.S. District Judge Henry Brooks ruled in favor of plaintiff Ohio River Oil Co. The oil company claims leasing rights under contracts with the Commonwealth of Kentucky.

Felmont Oil Co.—one of several defendants in the litigations—claims leasing rights under contract with Henderson County, Kentucky.

Opposing Ohio River Oil, in addition to Felmont, are Henderson County, various persons and companies claiming patents on the lease rights, and various oil producers. Each claims right to the leases from some governmental agency.

Value of the lease rights was estimated two years ago at about \$20,000/month.

'Fair Trade' Act Illegal: New Mexico supreme court has thrown out as unconstitutional a section of a 20-



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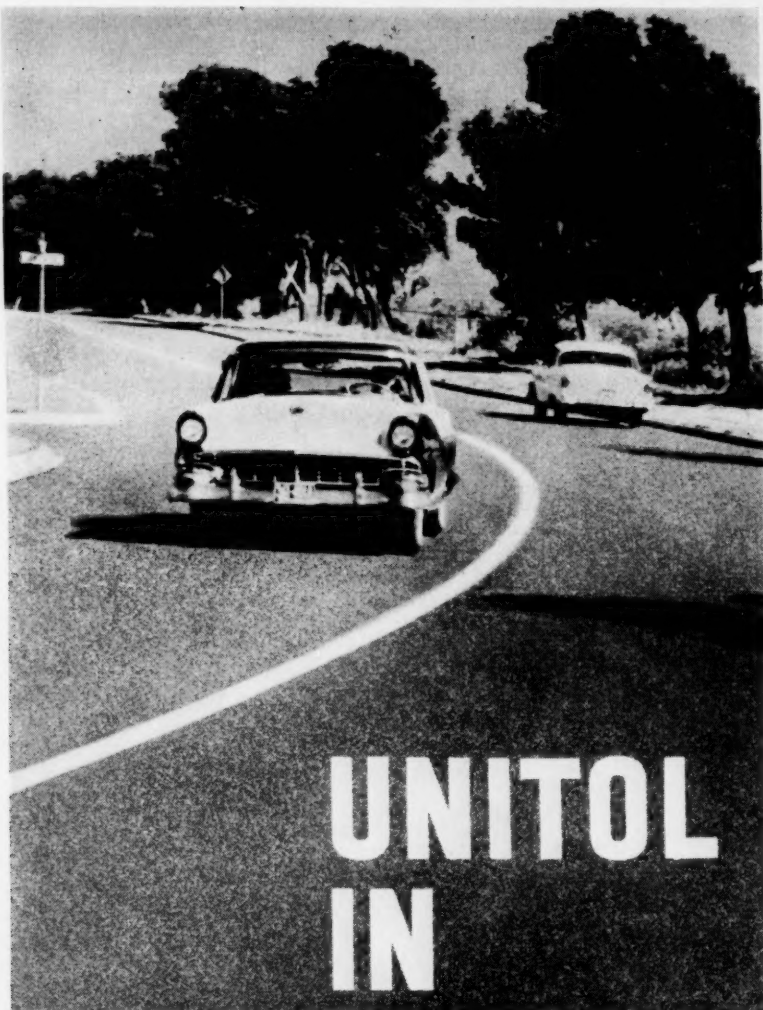


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ADMINISTRATION

year-old "fair trade" law, with the result that Miles Laboratories (Elkhart, Ind.) has failed in its attempt to prevent an Albuquerque pharmacy from selling Alka-Seltzer and One-A-Day vitamin tablets below the price fixed by Miles.

The voided section of the "fair trade" law (Section 1) made it unlawful for anyone to advertise or sell at less than contract price any commodity covered in a contract between manufacturer and retailer made pursuant to the act, whether or not the person advertising or selling was a party to the contract.

District Judge David Carmody—sitting in for Justice James McGhee—said the section "is unconstitutional and void as an arbitrary and unreasonable exercise of police power without any substantial relation to public health, safety or general welfare insofar as it concerns persons who are not parties to the contract provided for (in the disputed section)."

IDEAS

School for Nontechnicals: Reichhold Chemicals (White Plains, N.Y.) is seeking to improve morale of its nontechnical employees by providing courses on the basic chemistry behind the jobs they perform. Taught by the use of demonstrations, rather than textbooks, the lessons have caught the eye of labor officials, who plan to give union-sponsored courses.

More Emphasis on Patents: Hooker Electrochemical Co. (Niagara Falls, N.Y.) has formed a new patent department and employed three patent assistants. Formerly a research and development department group, the patent department now handles all Hooker patent and trademark activities.

LABOR

State Gets New Labor Law: Massachusetts' Gov. Foster Furcolo has signed into law a bill providing for state regulation of employee health and welfare funds, effective next May.

The law puts funds under the "prudent man" rule, which requires trustees to invest funds with regard to safety of the principal as well as the earnings.

A new division of health, welfare and retirement funds will be estab-



Geriatric Formulations

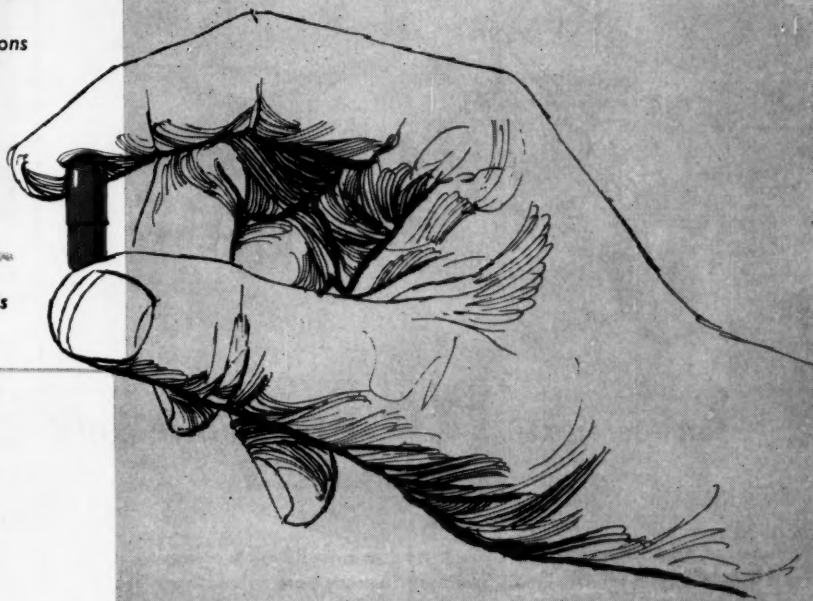


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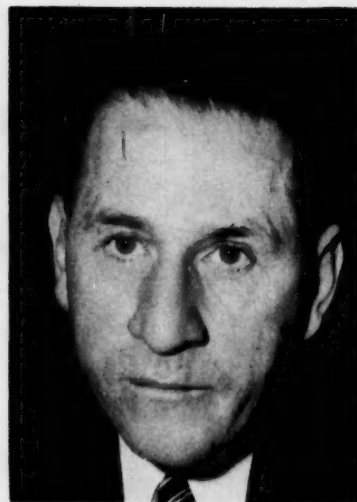
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ADMINISTRATION



Gov. Furcolo: Signed into law regulations for health and welfare funds.

lished in the state labor department. The division will be administered by a \$12,000/year director appointed for five years. The director will establish rules and regulations for the funds, with the advice of an advisory commission composed of state commissioners of labor, insurance and banks and banking. The labor commissioner will be the chairman.

The new law requires that health and welfare funds pay a \$50 registration fee and a \$10 annual filing fee to pay costs of the new division.

Lengthy Strikes End: Two lengthy, costly strikes in which feelings ran unusually high have been settled.

At Toronto, the 21-week-old Lever Bros. Ltd. strike ended with the signing of a three-year agreement calling for wage increases totaling 24¢/hour.

The agreement—retroactive to Nov. 18, '56—contains a provision calling for renegotiation of wages during the period from Oct. 15 to Nov. 15, '58, at which time a minimum of 5¢ will be added to the wage rates.

A modified union shop is also called for under the agreement, and strikers are to return to work as "early as possible," at least within the next 12 months. Some 17 employees have been penalized by extended layoffs for incidents arising out of the strike.

At Spencer Chemical Co.'s Henderson, Ky., works, an agreement has been reached with members of Local 644, International Chemical Workers

Goodrich-Gulf Chemicals, Inc.

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Types	Physical Properties*
1000	Tensile 3030 psi.
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	Modulus @ 300% Elongation . 980 psi.
	Mooney Viscosity— ML212°F. @ 4 minutes . . .
	Raw Polymer 48 Compounded Stock 55
1001	Tensile 3030 psi.
	Elongation 600 %
	Modulus @ 300% Elongation . 1010 psi.
	Mooney Viscosity— ML212°F. @ 4 minutes . . .
	Raw Polymer 47 Compounded Stock 55
1002	Tensile 3000 psi.
	Elongation 650 %
	Modulus @ 300% Elongation . 950 psi.
	Mooney Viscosity— ML212°F. @ 4 minutes . . .
	Raw Polymer 53 Compounded Stock 55
1006	Tensile 2850 psi.
	Elongation 590 %
	Modulus @ 300% Elongation . 1010 psi.
	Mooney Viscosity— ML212°F. @ 4 minutes . . .
	Raw Polymer 50 Compounded Stock 58
1007	Tensile 2760 psi.
	Elongation 620 %
	Modulus @ 300% Elongation . 890 psi.
	Mooney Viscosity— ML212°F. @ 4 minutes . . .
	Raw Polymer 48 Compounded Stock 54
1009	Tensile 1850 psi.
	Elongation 360 %
	Modulus @ 300% Elongation . 770 psi.
	Mooney Viscosity— ML212°F. @ 4 minutes . . .
	Compounded Stock 126

Selection Guide

General purpose rubber for products where color unimportant. Used for tires, molded and extruded products.

Similar to 1000, but less staining and discoloring. For tires, shoe soles and heels, molded and extruded products.

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*Typical average, production values. Cure 50' at 292°F.

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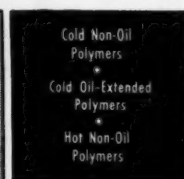
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Pages 330-334.



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IN 30 CITIES

ADMINISTRATION

Union (AFL-CIO), ending a 52-day strike.

The contract calls for a 10½¢-an-hour increase and an additional holiday. A union demand for union shop and checkoff provisions did not appear in the final agreement.

KEY CHANGES

F. R. MacCauley, to controller; and **Dallas Cantwell**, to general sales manager; Southern Nitrogen Co. (Savannah, Ga.).

John H. Schaefer, to staff vice-president; and **Glenn O. Hayes**, to general manager, manufacturing department; Ethyl Corp. (New York).

Thomas Zawadzki, to vice-president in charge of sales and director, Cary Chemicals (Milltown, N. J.).

William R. Blackstock, to product development manager, Chemical Division, Delhi-Taylor Oil Corp. (New York).

James C. Kirk, to director of research, Petroleum Chemicals (New Orleans).

Howard W. Bartlett, to manager of paper chemicals, Pennsylvania Industrial Chemical Corp. (Clairton, Pa.).

Roy Sorenson, to vice-president in charge of manufacturing; and **Alvin Emory**, to treasurer; American Molding Powder and Chemical Corp. (Brooklyn, N. Y.).

John W. McGovern, to president and chief operating officer; **Eugene A. Luxenberger** and **George R. Vila**, to group vice-presidents; and **Earle S. Ebers**, to vice-president and general manager of the chemical division; all of United States Rubber Co.

R. K. Turner, to president, Bakelite Co.; and **George C. Miller**, to president, Union Carbide Realty Co.; divisions of Union Carbide Corp.

Edgar Gordon Burton, **Reuben B. Robertson, Jr.**, and **Robert S. Oelman**, to directors; and **W. Powell Chase**, to director and vice-president, Soap Products Division; all of Procter & Gamble (Cincinnati).

DIED

John Parker, 71, president and owner, American Marine Paint Co. (San Francisco), at Redwood City, Calif.



CO₂ restored the flow

WHEN TAPS SLOWED TO A TRICKLE

A few years ago the water taps in one of our midwestern cities began to flow too gently. City engineers suspected the culprit was excess lime.

In the lime-soda ash process of water treatment it is customary to over-treat the water to assure maximum softening. This causes plugging of the water lines due to precipitation of the excess lime.

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Recarbonation of the treated water with CO₂ changed the lime to a more soluble form—and water pipes stayed free-flowing. The CO₂ system is successfully solving the lime problem in cities like Minneapolis, Minn., Columbus, Ohio, Eau Claire, Wis. and many other municipalities.

This is just one of hundreds of CO₂ applications that may lead you to a solution to one of your problems.

IS THERE A JOB FOR CO₂ IN YOUR PLANT?

Almost every day another manufacturer or processing plant finds that carbonic gas can improve the product, simplify an operation, cut cost, or increase safety.

CO₂ is now doing a job in such varied applications as these:

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- Making possible low cost gas shielded welding
- De-flashing molded rubber products quickly at low cost
- Improving paints and varnishes
- Freeze-drying pharmaceuticals
- A low cost, safe, weak acid for neutralizing
- As an inert atmosphere to prevent fire and explosion
- And hundreds of other applications

Some of these may be of direct interest to you, others may be adaptable to your field. If you'd like a broader list, we'll be glad to send you our booklet "CO₂ Applications Unlimited". Just check it on the coupon below. If you'd like detailed technical data on any of the applications listed in this advertisement, check those in the coupon too.

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- ☐ Other _____

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ARCHER-DANIELS-MIDLAND CO.
ASHTABULA, OHIO**

All equipment was installed by Cunningham-Limp Company also. The large warehouse and office building (right) is a C/L design and construct project.

A Building Experience You can come by... *Easily!*

You will readily appreciate, being in the business, the considerable experience it takes to construct a chemical processing plant such as this. Especially so, when you are told that the complete responsibility, even for the installation of the processing equipment, was assumed by the builder. Such building experience can be the means by which you secure a full dollar's value from every dollar you

budget for construction. Possession of it by C/L should certainly demonstrate to you that this company is fully capable of designing, engineering and building most any project you are planning—anywhere.

90% of C/L's business comes from repeat orders

Do you need a new processing plant—a new factory—or office building—or warehouse—or additions to your present facilities? Whatever it is—you will find in Cunningham-Limp Company the abilities and experience to design, engineer and build it for you, and a zeal to assume the entire responsibility within our organization. And perhaps the fact that 90% of our volume comes from old customers* will convince you that we are notably capable of doing so.

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- Building design and engineering
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 - Industrial plants
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 - Research laboratories
 - Chemical process plants
 - TV and Radio facilities
 - Power plants
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 - Railroad and Utility facilities



* In the building business, especially, repeat orders indicate customer satisfaction. Listed here are several of the well-known corporations which have found it profitable to use C/L's design-engineer-build services at two or more "nationwide" locations. The complete list is available, of course.

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Mankato, Minn.
Wyandotte, Mich.

CHRYSLER CORPORATION

Detroit, Mich.
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EX-CELL-O CORPORATION

Detroit, Mich.
Lima, Ohio

FORD MOTOR COMPANY

*Birmingham, Mich.
*Indianapolis, Ind.
Lima, Ohio
Livonia, Mich.
Monroe, Mich.
*St. Louis, Mo.
Wayne, Mich.

STORER BROADCASTING CO.

Atlanta, Ga.
Birmingham, Ala.
Detroit, Mich.
Miami, Fla.

SUNSHINE BISCUITS, INC.

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*designed by others

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Washington Newsletter

CHEMICAL WEEK
October 26, 1957

Some revamping of military research seems inevitable as part of the aftermath of the Sputnik earth satellite furor. At least, that's the view of many government officials charged with administering programs of both basic research and development projects.

No one is sure yet just what the changes will be, but, basically, the scientists expect that they'll eventually get some relief from the cut-backs on spending they've had to accept as part of the Administration's budget-balancing drive.

As yet, however, there's no indication of any big increase in spending for scientific research. Budget Bureau officials who are now reviewing the first drafts of the research budgets that will be presented to Congress next January are still trying to keep research spending down.

Actually, Air Force research contractors are already being told to cut an additional 5% off contracts expiring after the first of '58. The Air Force Office of Scientific Research says it will be out of money by November. This means its contractors will have to work "on the cuff" until the office gets more funds allocated to it in January.

Basic research should get the most benefit out of any switch in emphasis—if and when it comes. Secretary of Defense McElroy rates research much higher in importance than did his predecessor, Charles E. Wilson.

Scientists will look to Congress for more money—if the Administration doesn't allocate a sufficient amount. Democratic congressmen still remember the political hay they made over the Administration's decision to fire National Bureau of Standards Director Allen V. Astin—a decision it later rescinded.

"They're making mountains of every molehill of missile news." That comment, from one Capitol Hill sage, points up a situation you should bear in mind when reading newspapers. A few sentences from a speech that was to be read by William Holaday, special assistant (for guided missiles) to the Secretary of Defense brought headlines such as "Missiles start large shift to solid fuel; step to space travel."

The speech—read at this week's dedication of Thiokol's solid-fuel rocket engine plant—did say that "a large operational shift to solid propellents is a reality," but Washington experts point out only the Navy's Polaris missile will use solid fuel; the other services feel that, to date at least, there isn't enough reliable data on burning to permit use of solid propellents, particularly in the long-range ballistics field. Other Holaday quotes: "The specific impulse performance of solid propellents has been improved to the point where it is nearing that of liquid propellents now

Washington Newsletter

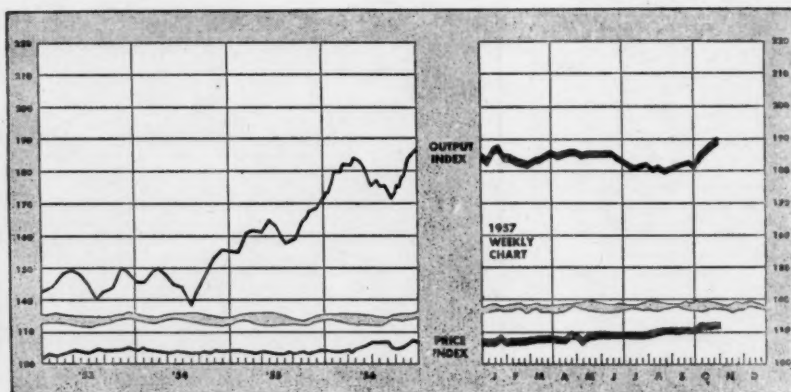
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used in current large liquid rockets. Manufacturers seem confident that solid propellents have not reached a performance or size limit."

A \$500-million fund to find chemical cures for cancer?—Congress may next year be requested to commit this amount in a lump-sum appropriation as the way to launch an expanded cooperative effort by government, industry and other research groups in this field. Sen. Richard Neuberger (D., Ore.) and the National Cancer Chemotherapy Center's top program advisors favor this approach.

Drug company and government negotiators are near agreement on ground rules governing patent rights, cost-sharing and other terms of cancer research contracts. Major remaining hurdle is industry's reluctance to risk large-scale investment of key research personnel and facilities in government cancer projects without firm guarantees of continuous funds from Congress. Thus the talk of a lump-sum appropriation large enough to support long-term contracts.

Progress note: The Cancer Chemotherapy Center is about to award eight more contracts totaling \$2.5 million to drug firms. The Upjohn Co. has the only contract awarded up to now. It will be paid \$150,000 to supply previously unavailable steroids for government testing.



Business Indicators

WEEKLY

	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	189.5	189.5	178.9
Chemical Week wholesale price index (1947=100)	111.0	111.0	105.8
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	39.57	40.18	44.92

MONTHLY

Wholesale Prices (Index 1947-1949=100)	Latest Month	Preceding Month	Year Ago
All commodities (other than farm and foods)	125.9	126.0	123.1
Chemicals and allied products	110.2	109.8	107.1
Industrial chemicals	123.6	123.6	121.9

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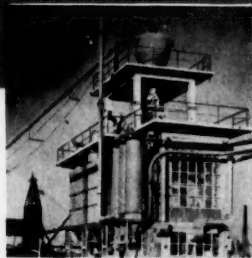
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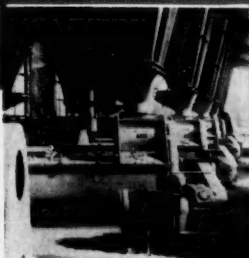
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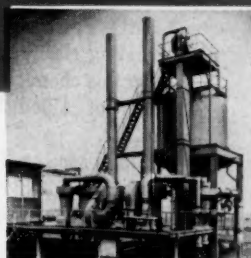
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Washington Newsletter

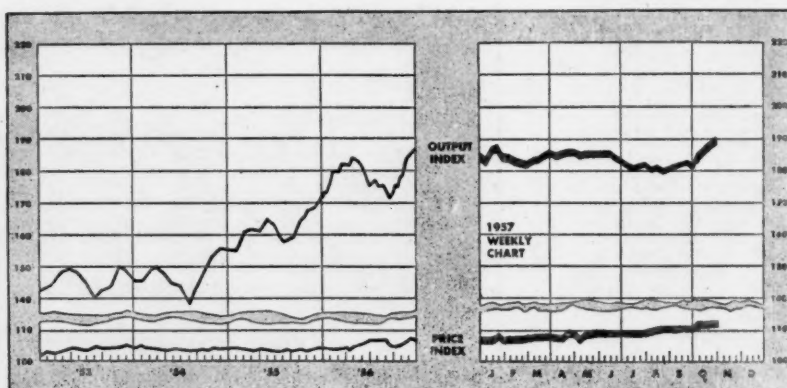
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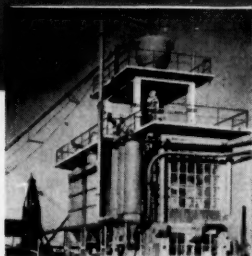
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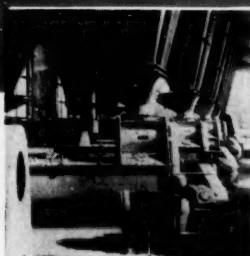
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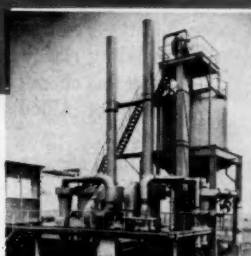
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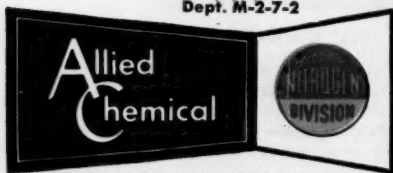
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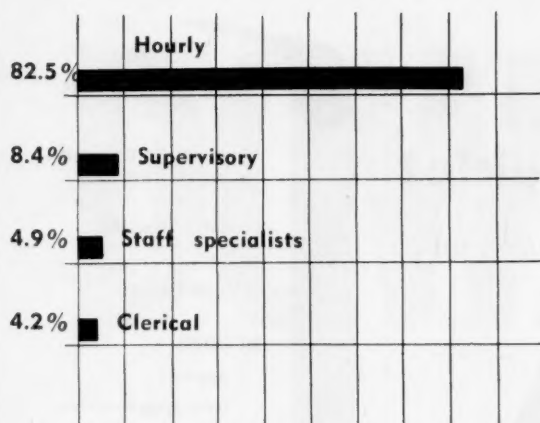


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PRODUCTION

Type of employees that work in chemical, petroleum, rubber industries:



In production:

	Percent
Supervisors, managers, foremen	8.5
Staff engineers, specialists	4.5
Clerical workers	3.8
Hourly workers	83.2

In maintenance and plant engineering:

Supervisors, managers, foremen	7.0
Staff engineers, specialists	5.1
Clerical workers	4.0
Hourly workers	83.9

How the chemical, petroleum and rubber industries compare with other industries:

Hourly	Percent	Supervisory	Percent	Staff Specialists	Percent	Clerical	Percent
1. Leather and leather products	90.8	Chemicals	8.4	Transportation	5.0	Transportation	9.9
2. Food products	90.5	Paper	7.1	Chemicals	4.9	Machinery	6.8
3. Textiles and textile products	90.0	Metals	6.8	Machinery	4.0	Chemicals	4.2
4. Lumber and wood products	89.5	Lumber	6.7	Metals	3.6	Metals	3.7
5. Stone, clay and glass products	88.5	Stone	6.7	Paper	2.3	Paper	3.4
6. Paper and paper products	87.1	Transportation	6.7	Stone	2.2	Food	2.9
7. Primary and fabricated metals	85.9	Leather	6.5	Textiles	1.2	Lumber	2.9
8. Machinery and allied equipment	84.1	Textiles	6.4	Leather	0.9	Stone	2.7
9. Chemicals, petroleum and rubber	82.5	Food	5.8	Food	0.8	Textiles	2.4
10. Transportation equipment	78.4	Machinery	5.2	Lumber	0.8	Leather	1.8

How Do You Deploy Production Manpower?

Chemical plant management this week has a brand-new yardstick (above) for gauging its own manpower operations. Moreover, it has some solid statistical backing for something that it had taken for granted for many years: chemical process plants have a higher percentage of maintenance workers and a lower percentage of direct operating labor than any other industrial group (see box, p. 52).

The figures, drawn from a recent *Factory Management and Maintenance* magazine survey of 226 plants

in 10 major industrial groups, deal with 35 chemical plants, petroleum refineries and rubber plants as one major group. Other chemical process industries groups, with which the chemical, petroleum and rubber group is compared include paper and paper products, stone, clay and glass products.

Maintenance High: According to the survey, the plant manager in the chemical, petroleum and rubber group uses more than 20% of his staff in various maintenance functions—high

for the 10 industrial groups. Conversely, the percentage of production workers is the lowest.

The percentage of supervisors and managers—8.4%—is the highest among all industries. And operating management is backed up with the second-highest percentage of non-supervisory staff specialists (i.e., engineers, technicians, designers, statisticians, staff assistants)—4.9%.

The chemical, petroleum and rubber group has the highest percentage of foremen (not separately listed but

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RUST REMOVERS
(PHOSPHORIC ACID TYPE)

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easier
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2

New
technical
booklet

Additional help is supplied in an expanded booklet on the Dowanol products. It's new in facts and straightforward presentation, brings you 52 pages that describe reactions, uses, analytical methods, and toxicological and handling information. Up-to-date tables and figures detail physical properties, pressures, densities, viscosities, evaporation rates, freezing points, refractive indices, and other data including solubility of various materials in the Dowanol compounds. Use coupon to get your free copy.

3

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facilities

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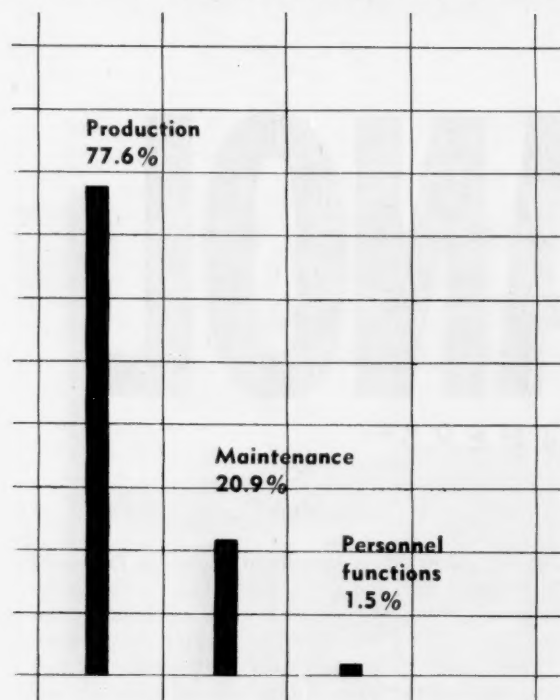
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*Dow produces the widest range of glycol ethers available.

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Where operating employees work in chemical, petroleum, rubber industries:



What production workers do

General administration	2.8%
Direct production	76.5
Materials handling	8.5
All other indirect	2.0
Industrial and production engineering	1.1
Quality control, testing and inspection	5.6
Production and inventory planning, scheduling	1.4
Budget and cost control	0.1
Design, construction and repair	0.2
Traffic and transportation	1.5
Other	0.3

What maintenance and plant engineering workers do

General administration	3.7
Electrical maintenance	8.5
Mechanical maintenance	46.3
Building and structures maintenance	15.0
Power plant	8.2
Cleaning and sanitation	12.2
Maintenance stores	2.6
Other	3.5

How the chemical, petroleum and rubber industries compare with other industries:

Production	Percent	Maintenance	Percent	Personnel	Percent
1. Leather and leather products	94.6	Chemicals	20.9	Paper	1.8
2. Textiles and textile products	93.9	Paper	17.2	Transportation	1.7
3. Machinery and allied equipment	91.8	Stone	15.2	Chemicals	1.5
4. Lumber and wood products	90.1	Metals	13.6	Metals	1.5
5. Transportation equipment	90.1	Food	12.8	Machinery	1.1
6. Food products	87.0	Lumber	9.4	Textiles	0.7
7. Primary and fabricated metals	84.9	Transportation	8.1	Leather	0.6
8. Stone, clay and glass products	84.3	Machinery	7.1	Lumber	0.5
9. Paper and paper products	81.0	Textiles	5.4	Stone	0.5
10. Chemicals, petroleum and rubber	77.6	Leather	4.8	Food	0.2

included in the supervisory figures)—6%. This percentage, broken down, reveals that chemical plants have the highest percentage—8.1%; petroleum refineries have 7% and rubber plants 5% of the operating staff as foremen. The average foreman supervises 19 people, but chemical, petroleum and rubber foremen supervise an average of only 14 people.

Maintenance Reverse: Yet, of total maintenance staff, the percentage of maintenance supervisors in the chemical, petroleum and rubber industries is one of the lowest of the 10 groups. And, it's the only group that has a lower percentage of supervisors for maintenance workers than for production workers.

Mechanical maintenance employees

are more numerous in the chemical group than in any other, represent 46.3% of the maintenance staff. Instrument maintenance groups—in many chemical firms instrument maintenance is the fastest-growing function—weren't singled out, have been included in the other maintenance categories.

Petroleum refineries have the high-

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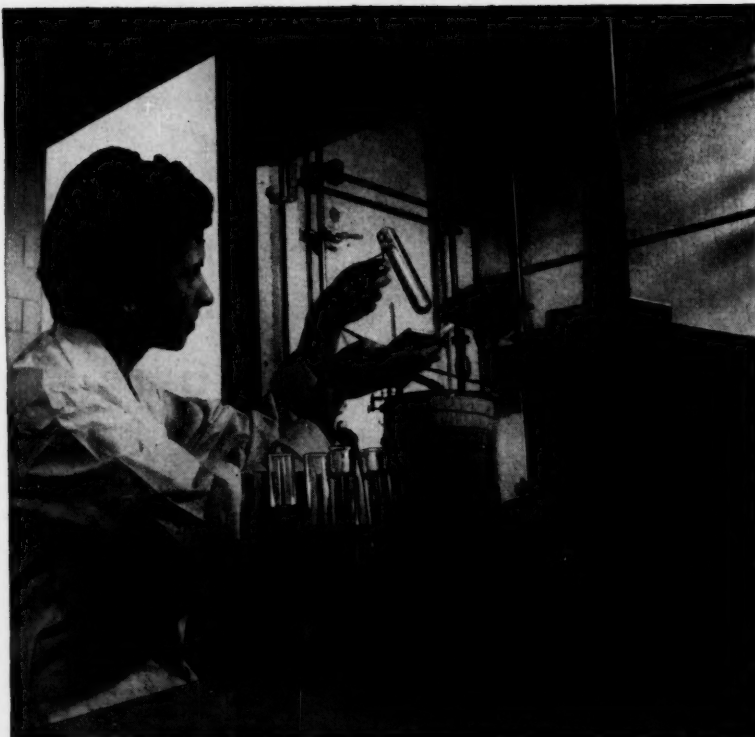
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a. gross
A COMPANY

295 Madison Ave., N. Y. 17, N. Y. • Factory: Newark, N. J.
Distributors in principal cities • Manufacturers since 1837

est percentage of maintenance employees in total plant operating staff—42.6% in the refineries surveyed. Chemical plants have an average of 29% in maintenance, but the variation between plants is greatest—from 5.3% in a zinc oxide plant to 54.3% in an ammonia plant.

In rubber plants, the percentage of maintenance employees is relatively low, averages about 10%.

No Pattern: The percentages of employees handling the various production functions—e.g., direct production, materials handling, quality control—generally fall in the middle of the 10 industrial groups. And there is no set pattern within the plants of the group. For example, materials handling may be high or low in phosphate plants, depending on the degree of mechanization rather than the product.

The figures give few surprises, but do point to areas that might be worth study. For example, budget and cost control figures show that this function belongs almost exclusively to the accounting departments. But it is recognized as a production function, to a certain extent, in the metals industry.

And, few chemical plants practice industrial engineering to any extent. Only 1.1% of production employees are engaged in this function. Of the 35 chemical, petroleum and rubber plants surveyed, 19 had no industrial engineering functions. Of the 226 plants in all industries surveyed, 70 had none.

EQUIPMENT

Freeze Protector: For protection of condensate lines from cold-weather freezing due to pressure failure or line blockage, Velan Steam Specialties Inc. (Plattsburg, N. Y.) offers its new Freeze Protector. The unit is installed in low points of return mains, before risers. Normal condensate temperature keeps valve closed. But when temperature drops to predetermined 90-120 F range, bimetallic element opens valve to the atmosphere. The protector is offered in ½-, ¾- and 1-in. pipe sizes and larger sizes on request.

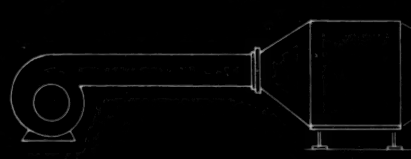
Contaminant Detector: A photo comparator, originally developed for checking out aircraft engines, is now being offered to the chemical industry



Continuous Atmospheric Rotary Dryer



Continuous Fluidized Bed Dryer



**Continuous Solvent Stripper
Continuous Gas Solids Reactor
Continuous Vacuum Dryer**

**Now, at one convenient
location, you can test-
dry your materials in
a variety of
equipment**

At General American's East Chicago pilot plant, you can test the drying or reacting of your materials in the widest range of drying equipment ever assembled in one place.

Louisville Dryer engineers will work with you—study your materials and needs, make recommendations for type of equipment, size and heating medium. You can check these recommendations for yourself through practical tests. Your Louisville Dryer is then engineered for most efficient and economical service—built specifically to meet your needs.

To test the drying of your materials in all these different types of drying equipment, call in a Louisville Dryer engineer. There is no cost or obligation.

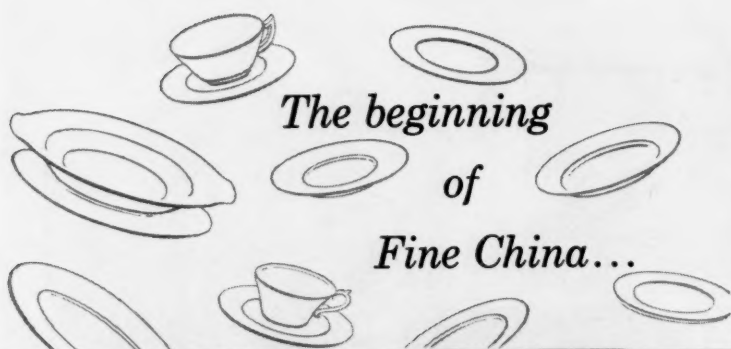
See us at the "Chem Show" Booths 436, 442 and 446



LOUISVILLE DRYING MACHINERY UNIT

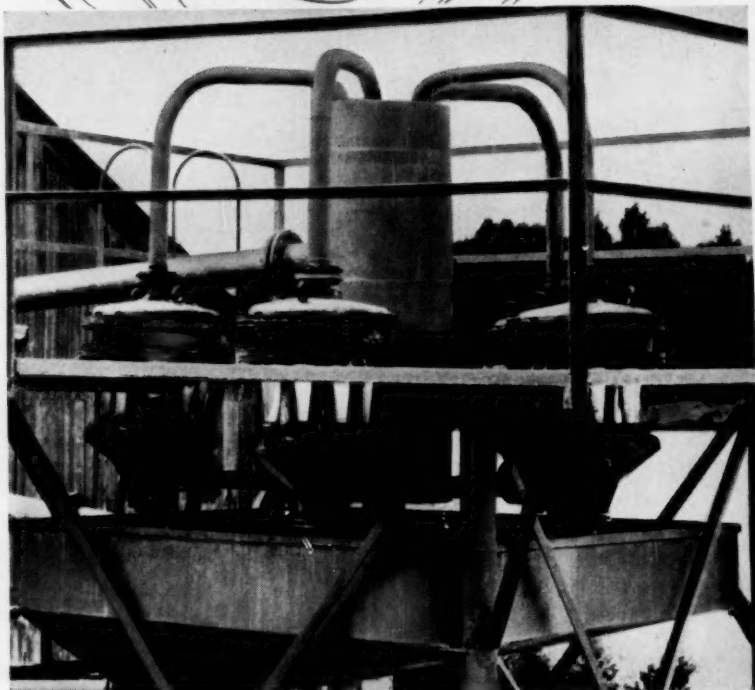
GENERAL AMERICAN TRANSPORTATION CORPORATION

*Dryer Sales Office: 139 S. Fourth Street, Louisville 2, Kentucky • Eastern Sales Office: 380 Madison Avenue, New York 17, New York • In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada
General Offices: 135 South La Salle Street, Chicago 90, Illinois.*



*The beginning
of*

Fine China...



Bavarian china has long been known for its excellence of craftsmanship, design and quality . . . and practically every woman's dream is to someday possess this fine china.

The beginning of this exceptional china is superior kaolin, such as produced at Dorfner, Bavaria, near Nuremberg.

In the production of kaolin, a fine white clay, as well as different fillers used in the manufacture of porcelain china, Dorfner uses four batteries of P-50 DorrClone units. Each of these batteries contains eight 2-inch diameter P-50 porcelain DorrClone units, which make a separation at approximately 15 microns at a feed pressure of 25 psi. The present plant capacity is 100 cubic meters per hour or 440 gpm. The DorrClone units were supplied by D-O's Associate Company in Wiesbaden, Dorr-Oliver G.m.b.H.

Whenever a process involves the separation of finely divided solids in suspension, the use of fluidizing techniques, or ion-exchange, it's a good plan to talk to Dorr-Oliver. The chances are that Dorr-Oliver and its Associated Companies throughout the world can be of service to you.

DorrClone — Trademark Reg. U. S. Pat. Off.



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WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
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PRODUCTION

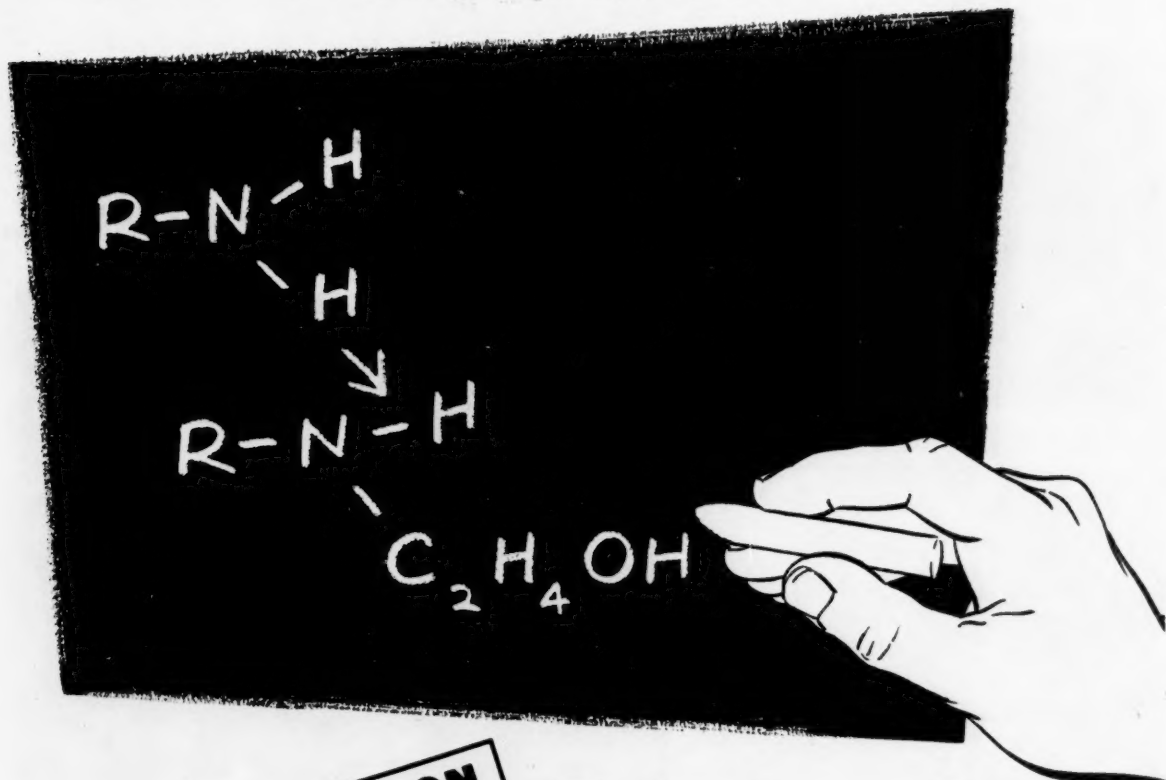
by Greer Hydraulics, Inc. (Jamaica, N.Y.), for detecting minute particles of contaminants in high-pressure gases in filters, dryers, separators, etc. The contaminants in the gas stream upset the unit's balance to trigger an alarm when they cross a photoelectric beam in the unit's sampling tube. The comparator is sensitive to 1/2-micron particles when present in 100-ppm quantities. The unit can be used in any transparent, inert gas circuit having pressures up to 10,000 psi.

Flow Switch: Potter Aeronautical Corp. (Union, N. J.) is out with a new flow-sensing device for chemical processes requiring low-flow detection at startup or shutdown, or for safety and sequencing controls. Called the Pottermeter Flow Switch, it is explosionproof, will withstand shock and temperature extremes. The unit for aircraft use, a 1-in.-diameter unit, weighs 12 oz., indicates flows as low as 0.1 gal./minute. The larger units indicate flows of 0.25-0.50 gal./minute. Operating temperature range is —85 to 550 F. The device is available in aluminum, stainless steel, bronze, nickel, Monel, Inconel and other metals, with flanged, flared tube and screw fittings.

Gas Turbine: Westinghouse Electric Corp. (Pittsburgh, Pa.) has added a new 3,250-hp. gas turbine for use as a mechanical drive for pumps, compressors and generators to its line of gas turbines. The simple open-cycle model operates at 8,500 rpm. (any output speed is obtainable using gearing). Operating speed is reached in three minutes. The relatively high exhaust temperature (775 F at 191,000 lbs./hour exhaust flow) can be used to produce low-pressure steam with a waste-heat boiler or heat exchanger in the exhaust duct.

Glass "Y" Valve: Corning Glass Works (Corning, N. Y.) is out with a new 2-in. glass "Y" valve in which all working parts exposed to the fluid being carried are made of Pyrex glass or Teflon. For safety, the body is armored with a fiber glass-polyester resin sleeve. The valve is recommended for acidic solutions at temperatures to 250 F, pressures to 50 psi. It is not recommended for hydrofluoric and hot concentrated phosphoric acids.

in your ethoxylations...



use **JEFFERSON** Ethylene Oxide

Ethylene Oxide combines with compounds containing labile hydrogens to give 2-hydroxyethyl derivatives.

AMINES and AMIDES react readily at the N-coupled hydrogens. For example, with amines:

- * Reactions proceed under mild conditions which preclude side reactions with solvent water or alcohol.
- * Alkylamines generally react more readily than arylamines.
- * Reactions with ammonia and amines are apparently promoted by polar solvents, and by hydroxyethyl reaction products.

And, for amides:

- * Hydroxyethylation of carboxylic acid amides and sulfonamides is promoted by alkaline substances.

Detailed information on these and other reactions is contained in Jefferson's new technical bulletin *Ethylene Oxide*.

Jefferson Chemical Company, Inc., 1121 Walker Ave., Houston 2, Texas

Need help in setting up for Ethoxylation?

In addition to having extensive laboratory experience with ethylene oxide, Jefferson has developed pilot plant and production techniques in the manufacture of Jefferson ethanolamines and other ethylene-oxide-derived chemicals. This practical experience can benefit you through practical time- and cost-saving ideas.

Write for Jefferson's
Ethylene Oxide
Bulletin—or call in
your Jefferson
representative.



Essential Chemicals from Hydrocarbon Sources



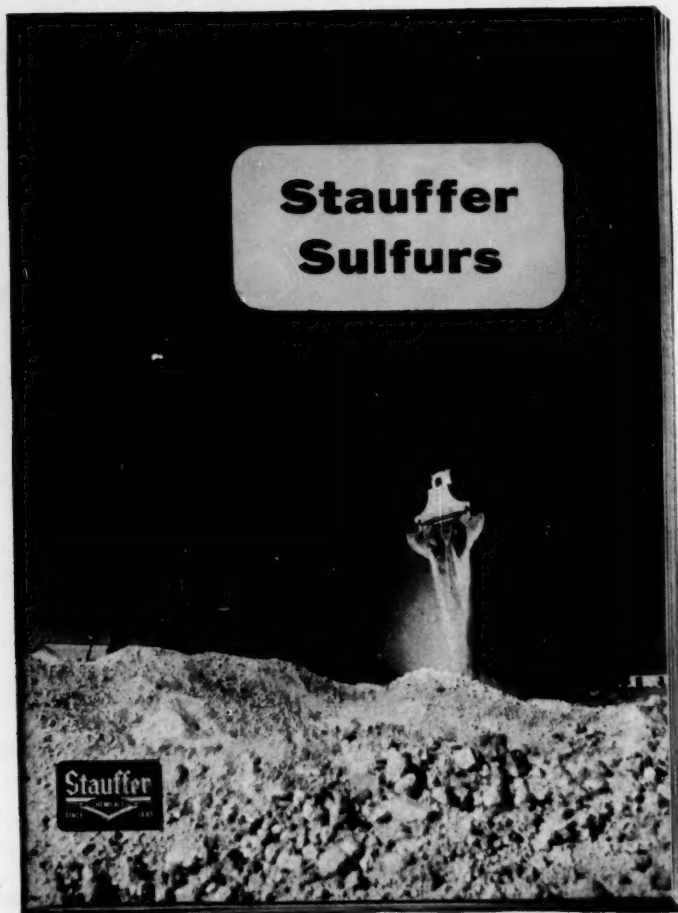
Jefferson
CHEMICAL COMPANY, INC.

Ethylene Oxide,
Glycols, Dichloride
Ethanolamines
Morpholine
Piperazine
Polyethylene Glycols
Nonyl Phenol
Surfonic® Surface-Active
Agents—N Series and
TD Series
Ethylene Carbonate and
Propylene Carbonate

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Sulfur

**NOW READY...
THE NEWEST BOOK
ON THE OLDEST CHEMICAL**



Stauffer Chemical Company — largest user and largest marketer of processed Sulfurs — has prepared a new, authoritative treatise and catalog on Sulfur. The history, preparation and uses, with a detailed description of Stauffer Sulfurs are included in a 52-page brochure with many illustrations and useful tables.

COPIES ON REQUEST; PLEASE WRITE ON YOUR LETTERHEAD.



**STAUFFER CHEMICAL
COMPANY**

380 Madison Avenue, New York 17, N. Y.
Prudential Plaza, Chicago 1, Ill.
636 California Street, San Francisco 8, Calif.

Chemical Week • October 26, 1957

SPECIALTIES



A single drop of Eastman's adhesive applied at noon will support . . .



. . . a load totaling 5,000 lbs. just half an hour later.



Strong New Entry into Adhesives Arena

A liquid adhesive containing no solvent and requiring no heat, excessive pressure or catalyst for curing is being looked over by industry this week. Developer: Eastman Chemical Products.

The adhesive, called Eastman 910, has remarkably rapid set-time and strength. It's potentially wide applications in industry and the home may put Eastman in the glue business—but right now, with limited production, Eastman hasn't defined its commercial plans.

The adhesive (a cyanoacrylate monomer modified with a thickening agent and plasticizer) was discovered accidentally, says Eastman, when a laboratory technician trying to determine the purity of a newly synthesized compound placed a sample of the material between two glass prisms of a refractometer, then found he couldn't separate the prisms.

To date, tests run on 910 indicate that it will form strong bonds with wood, glass, metals, rubber, plastics,

cork, felt, leather, cardboard and porcelain. These materials can be bonded to themselves or to dissimilar materials: glass and metal, for instance, can form strong bonds. The adhesive will also bond such plastics as cellulose acetate, cellulose acetate butyrate, styrene, polyester-glass laminates, phenolics, epoxies, acrylates, urethanes and vinyls.

Thin Glue Line: The amount of adhesive necessary to best bond a given area varies, of course, with the type of material and surface to be bonded. Smooth, nonporous surfaces—such as glass or machined metal—require one drop or less per sq. in. of bonding areas; porous surfaces require more (one drop per sq. in. is equal to 1 gal. per 925 sq. ft.). One drop of the material placed between two 2-in. steel rods fitted with eye bolts and allowed to set for 30 minutes supports 5,000 lbs. easily (*see cut*).

Eastman is especially enthusiastic about the material's short setting time, gives these values as representa-

tive "set" times: glass-to-glass, 10-15 seconds; wood-to-wood, 3-5 seconds; steel-to-steel, 15-20 seconds; steel-to-neoprene, 5 seconds; aluminum-to-aluminum, 45-60 seconds. Tensile strength (determined using the ASTM D-897-49 method) of the steel-to-steel bond at two hours is 2,005 psi.; at 48 hours, 5,030. Shear strength (ASTM D-1002-49T) for the same periods is 1,775 psi. A catalyst in acetone solution can be supplied for even faster bonding.

Heat Sensitivity: One weakness of the adhesive appears to be its limited resistance to high temperature. Ultimate limit of thermal stability of the bonds made with the adhesive is defined by the 165 C softening point of the cured adhesive. Temperature decreases to -17 C don't affect the bond appreciably. Specifically, bond strength falls off at this rate: at -17 C, tensile strength (after 24 hours exposure) is 4,620 psi.; 70 C, 7,230 psi.; 100 C, 4,594 psi.; 120 C, only 50 psi.

The adhesive possesses moderately

SEE HOW SOUTHERN NITROGEN USED ALCOA ALUMINUM TO BAN CORROSION

Southern Nitrogen Corporation, the South's newest nitrate fertilizer producer, recently completed a \$14-million plant near Savannah, Georgia. Nearly everywhere you look in this modern processing operation you see ALCOA® Aluminum (over 500,000 lbs) at work to combat corrosion. The photographs on these pages show a few of the many ways it is used there.

It's easy to see why Southern Nitrogen used so much ALCOA Aluminum. No other metal provides so many valuable benefits for such a wide variety of uses. And ALCOA, alone, can offer unparalleled technical assistance based on over 30 years' experience applying *all these aluminum advantages in the process industries:*

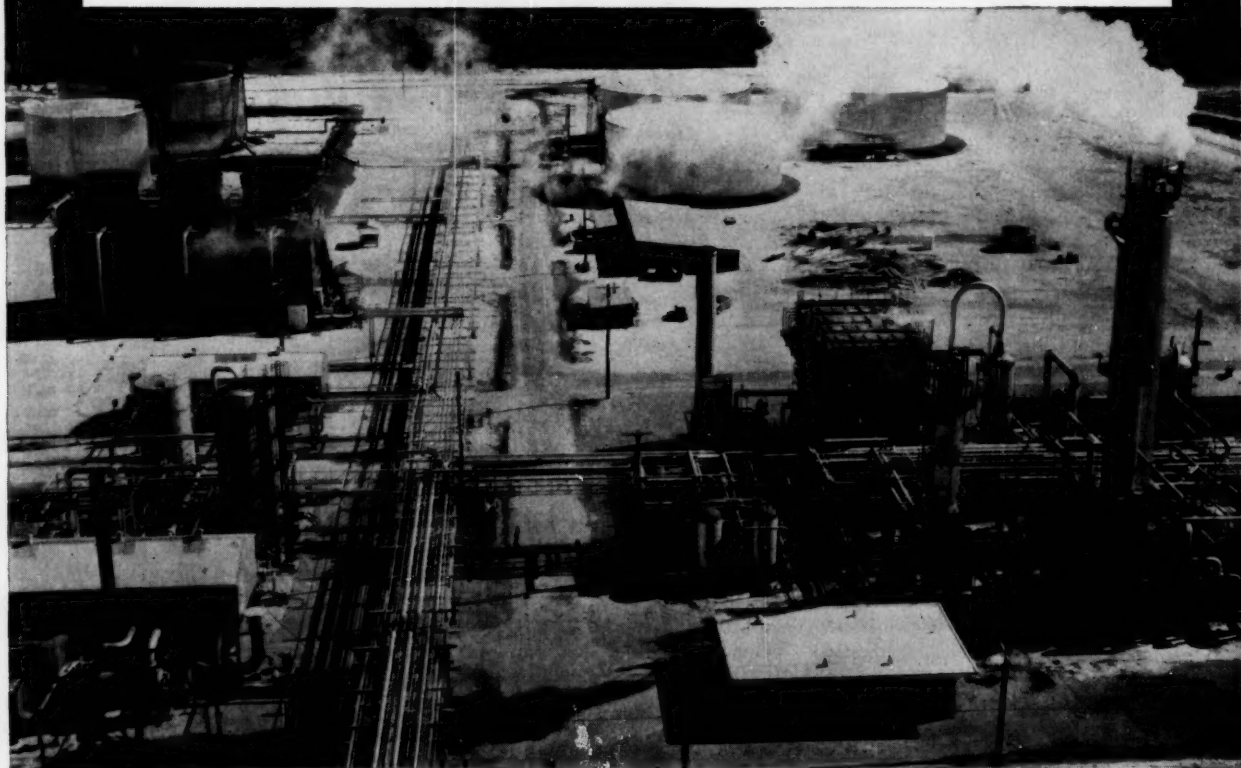
- *Excellent corrosion resistance* extends service life and reduces maintenance to a minimum.
- *Light weight—high strength* make handling easy and economical . . . often permit substantial construction economies.

- *High thermal conductivity* combined with corrosion resistance often makes aluminum the lowest cost material suitable for many demanding heat transfer operations.

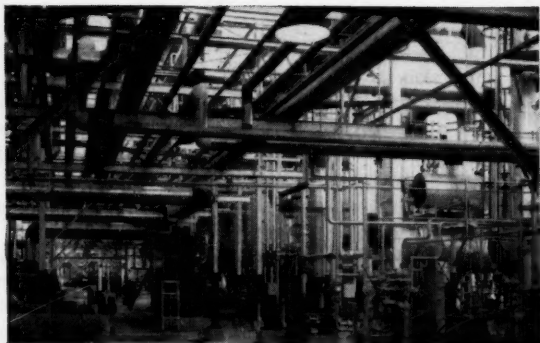
- *Nonsparking!* • *Nonmagnetic!* • *High reflectivity!*
- *Excellent electrical conductivity!*

The plant designers, The Girdler Company, made full use of all the advantages of working with ALCOA. They were able to employ the unequaled aluminum experience of ALCOA engineers . . . to help them choose the right aluminum alloys and fabrication methods for dependable, corrosion-free service in every part of the plant.

When you have a metal problem, call on ALCOA to find a sound, economical aluminum answer. Consult the nearby ALCOA sales office listed in the Yellow Pages of your telephone directory. Or outline your metal needs in a letter to ALUMINUM COMPANY OF AMERICA, 906-K Alcoa Building, Pittsburgh 19, Pa.

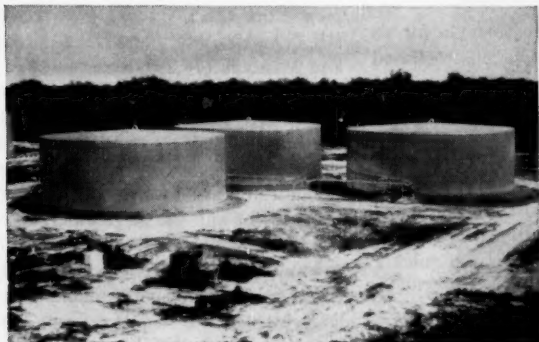


The Girdler Company designed this huge new nitrate fertilizer plant for Southern Nitrogen Corporation. The plant is designed for annual production of 120,450 tons of ammonium nitrate fertilizer, 91,250 tons of nitric acid, 10,950 tons of urea and 328,500 tons of fertilizer solutions.

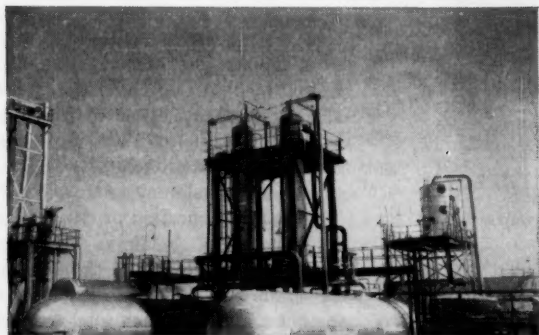
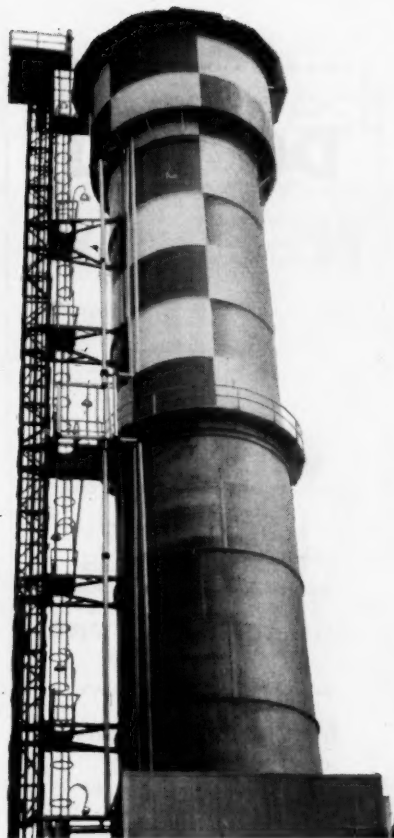


Plant employs thousands of feet of Alcoa Aluminum piping and conduit and is liberally painted with highly reflective aluminum coatings.

These 1,650,000 gallon storage tanks of Alcoa Aluminum alloy 5052 successfully fight the corrosive action of 85% ammonium nitrate. The tanks, 94 ft in diameter by 32 ft high, were built by Chicago Bridge & Iron Co.

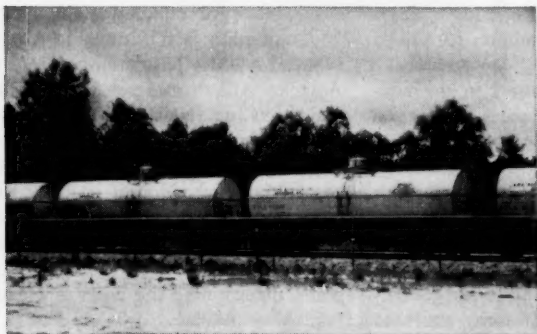


Corrosion-resistant Alcoa Aluminum (alloy 6061-T6) was used throughout this prilling tower . . . to prolong service life without frequent, costly maintenance shutdowns. Built by The Steel Products Co., Inc., Savannah.

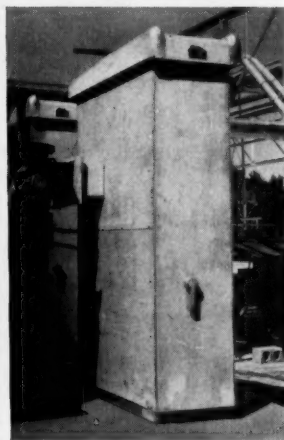


Alcoa Aluminum in these ammonia absorber coolers prevents corrosion while providing constantly high heat transfer efficiency. Coolers built by Henry Vogt Machine Co.

The superior corrosion resistance of Alcoa Aluminum in tank cars prolongs service life and prevents product contamination. Tanks built by Graver Tank & Mfg. Co., Inc. for Union Tank Car Co.



Lightweight gratings of Alcoa Aluminum are used in traffic areas throughout the Southern Nitrogen plant. They stand up under heavy traffic and easily withstand the attack of corrosive industrial atmospheres.



Alcoa Aluminum in electrical bus bar, conduit, fixtures and enclosures gives Southern Nitrogen effective protection from electrical breakdowns during prolonged exposure to corrosive industrial atmospheres.

 **NEW!**
"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings



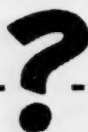
DO YOU NEED AN OIL

WITH
VERY LOW
VOLATILITY
(less volatile than vegetable oils)

NON-DRYING
PROPERTIES
(high oxidation resistance)

HIGH TEMPERATURE
STABILITY
(better than many synthetics)

MEDIUM TO HIGH
VISCOSITY
(30 to 750 centipoises at 210°F)



WRITE FOR INFORMATION
AND SAMPLES OF

**KENDEX SPECIALTY
OILS**

SUCH AS

KENDEX 0838

PROPERTIES

Specific Gravity, 60/60°F. . . 0.9135
Viscosity at 100°F. . . 5440 centipoise
Viscosity at 210°F. . . 156 centipoise
Flash Point, °F. (COC) 630
Color. Opaque, but yellow
in thin film
Composition Primarily alkyl
cyclo paraffins

SPECIALTY SALES
DEPARTMENT

**KENDALL REFINING
COMPANY**

BRADFORD, PA.

SPECIALTIES

good solvent resistance. Immersion in alcohol, benzene or acetone for periods of 24 hours does not greatly affect it. Weak alkaline solutions, however, weaken it considerably; weak acids do so to a lesser extent. Steam or combinations of high humidity and high temperature cause breakdown of the bond.

The new glue has one other handicap—high cost. The adhesive, in limited production now, costs \$5 in 1-oz. sample kits. Larger samples, in ½-, 1-, or 2-lb. polyethylene bottles, are also currently available.

Window Dressing

Du Pont has a new formula for an easily removed aerosol paint. Based on a copolymer of vinyl acetate and vinyl pyrrolidone, it's useful for aerosol formulations for spraying designs on metal, glass and other non-absorbent surfaces. The material sprayed does not soften or "run" under ordinary conditions encountered indoors; spray can be removed quickly by wiping with a damp rag. The formulation can be produced in a wide range of colors that dry tack-free in minutes. Du Pont, itself, won't make or market the material in aerosol packages; instead, is offering the formulation, free of charge, to aerosol loaders and marketers.

Nonfarm Fertilizer

Not all fertilizer ends up on the farm.

That's evident from the figures gathered in a just-completed study by A. L. Mehring, a long-time USDA official who is now a private fertilizer consultant. Mehring's figures indicate that nonfarm use takes 2-2.5 million tons, or about 10% of the 20-million tons annual consumption of fertilizer. Pegging the average fertilizer price at \$75/ton, this market adds up, says the study, to \$150 million to \$187.5 million annually.

Some of the big users in the non-farm category: residences (1,099,968 tons in 1956), golf courses (198,626 tons), airports (154,438 tons), athletic fields (142,035 tons), industrial plants (93,445 tons), municipal parks (90,608 tons), high schools (54,515 tons), college campuses (42,742 tons), seasonal hotels (41,327 tons), government buildings (38,550 tons), churches

(31,356 tons), highways (21,868 tons), hospitals (17,668 tons), and grade schools (12,440 tons). Other smaller users: cemeteries, commercial buildings, tourist courts, state and county parks, recreational camps, clubs and lodges, and fish hatcheries.

Bought in Bags: The nonfarm user, as well as the farmer, goes for the economy package; the report shows that the 80-lb. bag accounted for most of the tonnage.

Using census figures for 1954, top states in sale and usage of nonfarm fertilizers were Illinois (146,856 tons), Indiana (99,189 tons), Pennsylvania (94,038 tons), Ohio (87,615 tons), New York (86,179 tons), New Jersey (48,569 tons), Maryland (47,249 tons) and Missouri (44,291 tons).

In trying to determine the effect of community size on non-farm fertilizer consumption, Mehring's study disclosed that "generally speaking, per-capita rates are lowest for the very small towns and the large cities." The reason: "While small towns usually have detached houses and relatively large building lots, the number of large users, such as golf courses, city parks, public buildings, college campuses, industrial plants and memorial-type cemeteries, is limited." In contrast, points out Mehring, cities of from 20,000-50,000 population generally have many homes with large lawns and gardens. Thus, per-capita consumption is probably the highest of all city-population groups. Above 50,000, the proportion of row houses and apartment buildings increases; consequently, the size of the building lot diminishes. Thus, per-capita consumption is less, though total tonnage may still be high.

Management Booklet

How to make best use of the \$4 billion and 16 million man-hours expended toward building maintenance and sanitation is illustrated in a new 64-page booklet just published by the Assn. of American Soap & Glycerine Producers Inc. (New York). The booklet, written on the management—rather than service department—level, costs 75¢, covers topics such as the nature of the cleaning problem, types of cleaning materials, selection of cleaners, organizing the cleaning program, determining the costs of cleaning.

"It pays to see VICTOR" contest

**WIN A 15-DAY
HAWAIIAN VACATION
FOR TWO**

**35 other valuable prizes
Plus . . . bonus prizes!**

first prize

A trip to the spot you've always dreamed about. Fabulous, fabled, romantic Hawaii—the pearl of the Pacific. Home of the hula, Waikiki Beach, beautiful Diamond Head, Pearl Harbor—a land of enchantment. You can have 15 days in the paradise of the Pacific—for *two*—if you win first prize in the "It Pays To See Victor" Contest. Fly via United Airlines DC-7, Red Carpet service. All traveling and living expenses paid. You select the time you want to go (during 1958). It's fun! It's easy! Read the rules inside . . . enter the contest . . . and you may be the lucky winner who leaves the mainland (and worries) behind for 15 wonderful, carefree days. There's a five-day island cruise included, too!

15 second prizes



Admiral portable TV sets with 17-inch screens will be awarded to the 15-second-place winners. Here's an easy way to get that second TV set.

20 third prizes



Admiral transistor radios will be given to the 20 third-place winners. These popular, electronic marvels bring entertainment wherever you go.

See inside for contest puzzle, complete rules, and details about bonus prizes!



it's fun ! it's easy !

HERE'S ALL YOU DO . . .

Study the clues carefully . . . then fill in the missing letters. Extra clues to each of the names or abbreviations of Victor chemicals in the puzzle are given in the story on the back page. One word of caution . . . a few of the *regular* word choices are tricky; so be careful. Winning entries will be selected on the basis of the greatest number of correct words. The correct solution to the puzzle is locked in the vaults of the First National Bank, Lake Forest, Illinois.



OFFICIAL ENTRY BLANK

"It Pays To See Victor" Contest, Box 7908, Chicago 77, Illinois

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____



Bonuses! Bonuses!

If you submit your entry on the special contest entry blank obtainable at Victor's booth at the 26th Exposition of Chemical Industries...and your entry is a winner...you will receive one of the bonus prizes.

The Hawaiian trip bonus will be a matching set of canvas airplane luggage. Portable TV winners will receive a handsome table for their set. Transistor radio winners will receive a genuine leather carrying case.



CLUES ACROSS

3. Perform.
6. As alike as two — in a pod.
10. Girl's name.
13. What we breathe.
14. Torrid.
16. Player of a certain stringed instrument.
18. Prefix of a Victor calcium phosphate used in dentifrices.
20. Good advice for buyers of chemicals (5 words).
26. Maker of beer.
28. To mail, as a letter.
29. Those getting off airliner.
31. Amounts bet unsuccessfully.
34. Eggs of fishes.
35. A favorite.
36. Boy's nickname.
37. Dish of boiled meat and vegetables.
38. — way may well be where you might arrange to meet someone.
40. Endured.
42. Gaze or look fixedly.
43. Prefix of a Victor ammonium phosphate used for flame-proofing.
44. Prefix of a Victor complex phosphate used in prepared cake mixes.
46. To taste or smell with pleasure.
47. Shoshonean Indian formerly ranging in Utah, Colorado and New Mexico.
48. Also.
51. Tumultuous disturbance of the public peace.
52. Group of things, as dishes.
54. Short for "father."
55. Not apt to succeed if somewhat weak.
57. To have a tumble-down — on his place won't please efficient farmer.
58. Preposition.
59. Perceive by the ear.
60. Group pulling together.
61. Indefinite article.
62. In football, the worse this is, the less enthusiasm will be shown.
63. One is grateful to find paper available in — room.
64. Man who devotes life to sensual pleasure.
65. Nobleman ranking below a marquis.
66. Something presumably is wrong if lovers exchange — looks.
67. The — the cars on the highways, the lower the traffic toll should be.

CLUES DOWN

1. You would scarcely say teacher who — is setting good example for pupils.
2. If he — long enough, spoiled brat generally gets his own way.
4. Military horses trained to attack.
5. Plaything.
6. An acid used in a solution to bright-dip aluminum.
7. Point of the compass.
8. You — smart to see Victor.
9. Hastened.
10. Prefix of a Victor complex phosphate used in synthetic detergents.
11. Abbr. of a Victor chelating agent to control certain ions in water.
12. King of beasts.
15. Abbr. of a Victor phosphate used in washing and cleaning compounds.
17. Always.
19. New girl may help fellow who's been jilted to forget the —.
21. Dickens wrote "Oliver —."
22. Prefix of a Victor sulfide used in the manufacture of oil additives.
23. Preposition.
24. Lucid.
25. Gossip is just the kind of thing people may —.
27. Spare the — and spoil the child.
30. Primary color.
32. In hot weather, it's hardly surprising if boiler room worker — a little at his work.
33. You'd be pained, of course, if someone should — you.
39. Indefinite article.
41. Statue of Liberty is a rare sight for — eyes when liner arrives in New York.
42. Fellow who's — may offer to toss coin for the drinks.
43. Point of a fable.
44. In one's youth, one might well have been —.
45. It's not surprising that his rooms are untidy.
49. Not transparent.
50. Schoolboys are naturally expected to eat a good — at noon.
52. Male deer.
53. In that place.
55. Hearing someone shout this might make nervous person jump.
56. Prisoner's quarters.
58. Insect.
61. Help.











CONTEST RULES

1. This is a contest of skill. Study the clue definitions carefully, before writing in your answers. There is only one correct solution. If no correct solution is received, those most nearly correct, based on the number of correct words, will be selected as winners. Judges have been appointed by Victor Chemical Works, and they will consider all entries and determine the prize winners. By entering, entrants agree that the decision of the judges shall be final and binding. No entries will be returned. All entries become the property of Victor Chemical Works.
2. After you have filled in your answers neatly and clearly, fill out the official entry blank and mail the puzzle and the entry blank to: "It Pays To See Victor" Contest, Post Office Box 7908, Chicago 77, Illinois.
3. All entries of solutions to the puzzle must be post marked before mid-night, December 20, 1957, and received before January 3, 1958.
4. Entries shall be limited to persons over 21 years of age, and who are residents of the continental United States, except employees of Victor Chemical Works, its advertising agency, and members of their families. Only one entry per person will be accepted.
5. In the event more than one contestant submits a perfect solution to the puzzle, or in the event that entries receive an identical rating, these entrants will be asked to complete the statement: "In the ----- industry, it pays to see Victor because . . ." in twenty-five words or less. Such statements will be judged on the basis of originality and aptness, and duplicate prizes will be awarded in case of ties.
6. There are 36 prizes, as shown elsewhere in this announcement.
7. Any winner, submitting the puzzle on the special entry blank, obtainable at the booth of Victor Chemical Works, at the 26th Exposition of Chemical Industries, will be eligible to one of the bonus prizes in accordance with details outlined in this announcement.
8. Contest is subject to all Federal, state, and local regulations.
9. Winners will be notified by mail about March 1, 1958. After the winners have been announced, the correct solution to the puzzle will be mailed to anyone sending a stamped, self-addressed envelope. Requests should be sent to: Advertising Department, Victor Chemical Works, 155 North Wacker Drive, Chicago 6, Illinois.


from San Francisco (and everywhere)

It pays to see VICTOR



Two lucky people will board a beautiful, United Airlines Mainliner  after winning first prize in the "It Pays To See Victor" contest. They'll be traveling in style, comfort, safety, and good health, thanks to many Victor  chemicals. Imagine, if you will, how many times they will use, or come in contact with Victor chemicals on their flight to Hawaii. For instance, before they take off, the ground crew refuels and checks the oil in the plane.  Flights are faster because today's engines are lubricated with oils containing additives made with phosphorus pentasulfide. Now, let's look at some of the bright ideas aboard. Aluminum sections, trim, and parts (to save weight),  are in evidence almost everywhere you look. The shiny finish is the result of being bright dipped in a solution containing phosphoric acid. Surprised? Have a seat, and look at the colorful window curtain.  The fabric has probably been made flame resistant by dipping in a solution containing mono-ammonium phosphate. In addition, many fabrics, even clothing  of the passengers and crew, were dyed with the aid of Questex (EDTA—ethylenediamine tetra-acetic acid). Hungry? When the stewardess brings the meal  the dessert could well be a piece of cake . . . made light and tender because the phosphate leavening agent used is sodium acid pyrophosphate. No washing dishes up here, of course, but when they are washed in modern, commercial dish-washing equipment,  they will be spotless and sanitary if the washing compounds contain chlorinated TSP (trisodium phosphate). Lean back and relax.  The pillow case and other individual articles used for personal comfort during the flight have been laundered fresh and clean with a detergent containing sodium tripolyphosphate. Getting anxious? Almost before you can say . . . "It pays to see Victor", the hostess will be saying, "Aloha"!  As you deplane, she smiles, and her beautiful white teeth are evidence that the dentifrice she uses contains dicalcium phosphate. The list of uses of Victor chemicals is endless . . . and when the commercial "jets" begin flying, you can bet that Victor phosphates, formates, and oxalates will be a part of them, too!

VICTOR CHEMICAL WORKS
155 North Wacker Drive, Chicago 6, Illinois

 **VICTOR**
Dependable Name in
Chemicals
for 60 Years

SPECIALTIES

Raising the Wage Floor

Next week (Oct. 30) is the deadline for paintmakers to go on record about the proposed new set of wage minimums for employees of firms holding \$10,000 or more in government contracts. Earlier this month, both management and union officials agreed that a boost in Walsh-Healey Act wage floors for the paint varnish and related products industry is needed. The question: How big a boost?

At that meeting, Joseph F. Battley, president of National Paint, Varnish & Lacquer Assn., said that paintmakers will go along with a boost to \$1.25/hour, except in the South, where he endorsed a \$1.05 floor. This proposal, said Battley would raise rates in 37% of the South's paint establishments, and also in a fourth of the non-Southern plants.

AFL-CIO, not unexpectedly, wanted more, urged a new nationwide \$1.60 minimum—or regional rates varying from \$1.21 in the South to \$1.81 on the West Coast. Paint plants in the Midwest, urged AFL-CIO economist Bert Seidman, should pay a minimum \$1.66, and Northeastern plants, \$1.53. Spokesmen for Independent United Mine Workers (District 50) tried to up the ante. The union—claiming it negotiates for 30,000 of the industry's workers—asked Labor Secretary Mitchell to set a uniform \$1.66 minimum.

Both sides buttressed their positions with data from an Oct. '56 government wage survey of the industry. This showed 50.6% of the industry workers earned at least \$1.65/hour, that half the industry's plants paid regular employees no less than \$1.46. AFL-CIO split the difference, added another nickel for wage increases since the survey period, and proposed the \$1.60 minimum. To this, manufacturers countered that the "act requires the Secretary [of Labor] to determine the prevailing minimum wage—not an 'average' or 'reasonable' wage."

At present, non-Southern companies must pay at least \$1.05/hour straight time—the Walsh-Healey floor in effect since '52—to share in the federal \$17-million/year paint-buying program. Until Congress upped the federal minimum wage to \$1 last year, plants in 12 Southern states could qualify with an 80¢/hour minimum.

A new wage formula probably

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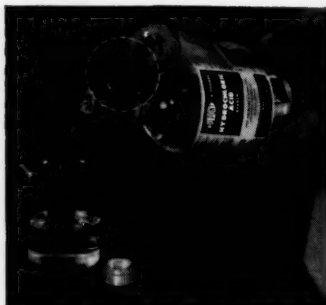
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5 safety factors

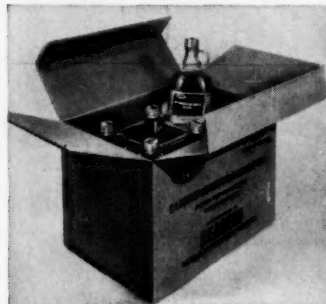


NEW! Safety factor 1—Single-trip packaging of one-pint size should result in better house-keeping. This feature offered at no increase in price!



Safety factor 2—Safety grip for pouring from 5-pint bottles.

Safety factor 3—Dripless sleeve on pouring lip of all 1-pint and 5-pint bottles.



Safety factor 4—Throw-away bottles and cartons reduce possibility of improper re-use. One man can safely handle these light cartons.

Safety factor 5—Color-coded caps and labels.

On your next order specify:

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*Throw-away bottles in 5-pint size only.

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... safer to handle
because of these
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● DRIPLESS SLEEVES

All bottles of Du Pont Reagents are now equipped with dripless polyethylene sleeves on the pouring lips of the bottles. Safer, more accurate pouring ... no dribbles to cause burns or deface labels. They also eliminate the "rings" on laboratory shelves or benches where reagent bottles are placed.

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No deposits	Less bookkeeping
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Less freight	Safer handling

● SAFETY GRIPS

These new safety grips on all 5-pint bottles provide a secure and convenient hold for lifting and pouring ... a definite safety factor that will help prevent spills and burns.

Color coding is an additional safety feature on Du Pont Reagents. Distinctively colored labels, with matching bottle caps, insure unmistakable identification.

DU PONT REAGENTS MEET AND SURPASS A.C.S. AND ELECTRONIC GRADE SPECIFICATIONS.



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

SPECIALTIES

won't be fully settled before next spring. By that time, too, soap, syndet and cleanser producers should have a decision from Mitchell on their own new Walsh-Healey rate. Last June's hearing for that industry elicited proposals by the union to jack up the present nationwide \$1/hour to \$1.56/hour.

Probably ready in a matter of weeks will be Mitchell's decision on a boost in the present \$1/hour drug industry minimum. Industry spokesmen expect that the new floor will be around \$1.30—about half way between the \$1.45/hour proposed by organized labor and the \$1.20/hour figure put forward by management.

PRODUCTS

Felt Cleaner: A paper-mill felt cleaner that can be used with any color has been developed by Clinton Chemical Co. (Santa Monica, Calif.). Called Felteen, it is an acid-base compound, is said to be nonstreaking, even with yellow dyes.

Fabric Conditioner: Zelcon C fabric conditioner is the latest product being pushed by Du Pont's Dyes and Chemicals Division. Designed to help laundered goods maintain their moisture absorbency, the product imparts static resistance to synthetic fibers. It is being tested for bacteriostatic properties.

Black Finish: Black finishes may be put on plain zinc die castings or zinc-plated parts in from 10 to 120 seconds (depending on temperature) by immersion in a new colorant, called Nero Zinc. That's the claim of Wagner Brothers Inc. (Detroit), the product's maker. The liquid is used in a one-to-three solution with water heated to 110 to 150 F.

Throwaway Pen: A disposable fountain pen for industrial marking has been developed by Organic Products Co. (Irving, Tex.). Tradenamed Mark-All, the pen comes filled with ink (black, white, yellow, red, orange, green or blue), will write on both porous and nonporous surfaces. The body of the pen is of polyethylene; the writing point, felt. Cost: \$1.

Stain Chaser: A new liquid preparation for removing X-ray and photo-

ENGINEERS...

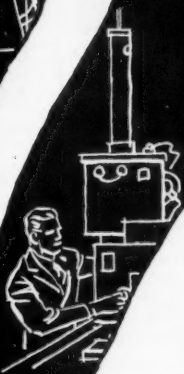
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**Mississippi Lime Company's entire limestone deposits have a natural purity and uniformity unequalled in such quantity anywhere. The entire formation tests 99% pure calcium carbonate.*

It is because of the purity of this limestone, carefully sealed deep underground in Southeast Missouri, that Mississippi High Calcium Lime and Mississippi Lime products have earned a national market.

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Our half-century of experience in mining and processing "the great white servant of industry" is at your service. Our skilled technicians will consider it a privilege to consult with your technical staff on possible applications or help in the solution of any problem.

MISSISSIPPI LIME COMPANY
ALTON, ILLINOIS



SPECIALTIES

developer stains from clothes and linens has been introduced by A. L. Wilson Chemical Co. (Kearny, N.J.). Called Exgo, the product is also effective on stains from medicines having a silver nitrate base.

Gasoline Tint: Patent Chemicals Inc. (Paterson, N.J.) has introduced a new fluid dye for coloring gasolines and other petroleum products. It's called 25% Dye Concentrate (25% solid content), is available in all colors.

Silicone-Epoxy Coating: A protective coating formulated of silicones and epoxies and available in 22 standard colors (and clear) is now being marketed by Mono-Seal Products (Everett, Mass.) under the name Mono-Seal. It's described as a hard, glossy coating, is said to provide protection against acids, alkalis, oils, solvents, moisture, abrasion, impact and temperature extremes. Mono-Seal comes in three separate cans (resin, activator and thinner) and can be applied by brush, spray or dip.

Office Help: Gulf Plastic Petroleum B is the name of a new lubricant marketed by Gulf Oil for use in business machines. The material is thixotropic, won't run off the part it lubricates. Plastic Petroleum B will provide lubrication over a wide temperature range.

Odor Bane: A permanent type of deodorant applicable to most textile fabrics (except cotton) was recently developed by Carolina Aniline & Extract Co. (Charlotte, N. C.). Trade-named Anti-Pers Al No. 1, the finish is a combination of an acrylic emulsion with hexachlorophene and acrylic polymers. The company suggests the material be applied to fabric used in such items as surgical gauzes, under-arm pads, inner linings for shoes, and clothing such as sport socks, hat bands, underclothing and sanitary products. The finish can be applied continuously or by padding (at temperatures under 100 F). Solid content (particle size: 1 micron) is 46.4%; hexachlorophene content, 14%; pH, 5. Both bath and storage stability is said to be excellent. No yellowing of fabric or color change, says the company, is indicated by Fadeometer tests. Silicone compounds, however, impair the efficiency of the product.

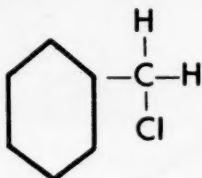
BRIEFS

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Chloro Aromatics
Phosphorous Acid
Oxalic Acid
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Chloro aromatics would carload delivery save you some juggling?

If your processing requires use of the benzyl, benzoyl, or nitrobenzoyl groups, you'll find Hooker a convenient source of supply for intermediates.



Benzyl chloride, for example, is available in 5-gallon and 13-gallon carboys, in 55-gallon steel or nickel drums, and, if you prefer bulk shipment, in nickel-lined tank wagon.

Other Hooker chloro aromatics you'll be interested in include:

Benzyl chloride
meta-Nitrobenzoyl chloride
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All are uniformly high in purity. The meta- and para-nitrobenzoyl chlorides are available in commercial quantity only from Hooker. You can have as little as a 5-gallon container or as much as a carload delivered promptly.

If you'd like to know more about any of these compounds, check the coupon for technical data sheets.

formation and, possibly alone or with other catalysts, in cross polymerization of olefins, alkylation of aromatics, and dehydration reactions.

You can use it to inhibit discoloration of some products by mineral acids; to deposit nickel and cobalt phosphides in plating; and to prepare dialkyl phosphites.

Are you planning any of these operations? If you feel that H_3PO_3 might ease a problem, use the coupon to request specifications and typical properties. Better still, write us on your business letterhead for a sample.

Oxalic acid your Hooker distributor has it

Oxalic acid is one of our OLDBURY products that really get around.

Its uses run the gamut from "precipitating agent for rare earth salts" to "cleaning railroad cars."

This mild acidifying agent is widely used to remove rust stains from textiles and to eliminate rust from auto radiators. It helps control shading in textile dyeing. It's used in organic synthesis, in preparation of organic and inorganic oxalates, and as a catalyst in some organic reactions.

You can get OLDBURY oxalic acid now from your Hooker distributor in less-than-carload quantities. This acid assays 99.8% min. It comes in two pure white crystal sizes, No. 2 fine and No. 3 fine, packed in 100-lb. and 300-lb. Leverpak containers.

Ask your Hooker distributor to put

a container or two in with your next order. Meanwhile, a check mark on the coupon will bring you specifications, typical analysis, particle size, and other data.



New wall chart helps you handle chlorine safely

A useful adjunct to your plant safety program is this new Hooker chlorine wall chart.

It can help prevent accidents by showing your employees the most important do's and don'ts for handling chlorine. In concise, easily understood language, it explains the operation of tank car, ton container, and cylinder valves; describes safe storage methods; and tells what to do in an emergency.

If you'd like a copy of the chart for posting, ask your Hooker salesman or check the coupon.

H_3PO_3 what can't you do with it?

Reducing agent, catalyst, color inhibitor, plating assistant, intermediate—there's almost no end, it seems, to the tasks you can tackle with *phosphorous acid*, H_3PO_3 .

Produced in glass equipment, this OLDBURY® product comes to you as a 70% clear water-white aqueous solution, or as a white crystalline flake assaying 97% min., deliquescent and very soluble in water.

We're uncommonly proud of the flake form, which is presently saving one of our customers \$45,000 a year in processing costs.

A strong dibasic acid, H_3PO_3 goes into phosphite salts used as plasticizers. It can serve as a catalyst in ether

For more information on chemicals mentioned on this page, check here:

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| <input type="checkbox"/> meta-Nitrobenzoyl Chloride | <input type="checkbox"/> Chlorine Wall Chart |
| <input type="checkbox"/> para-Nitrobenzoyl Chloride | <input type="checkbox"/> New list of products—Bulletin 100-A |

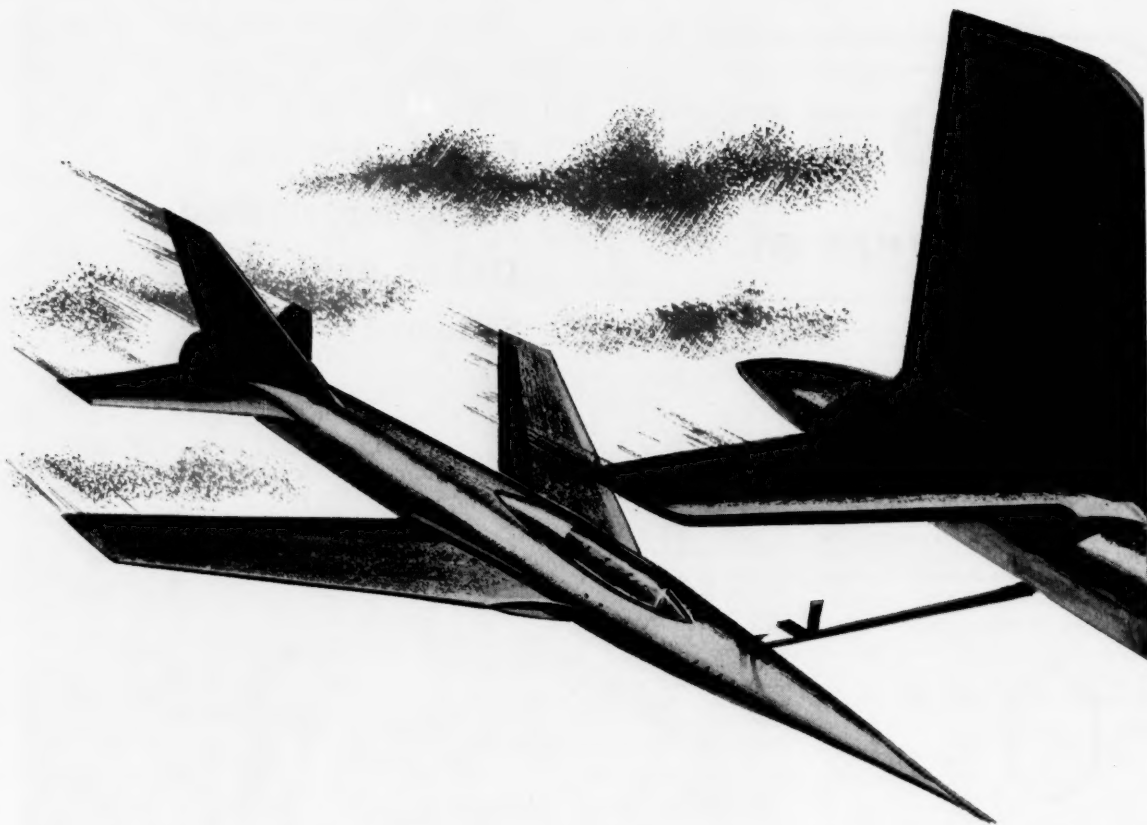
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Sometimes production lines are as difficult to refuel as are aircraft—and like aircraft, must be supplied without interruption to operations. That's why a "silent partner" like **Picco Resins** proves to be a great asset.

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Picco Resins, para-coumaron-indene polymers produced with exacting controls, are the ideal thermoplastic hydrocarbons for the diverse compounding industry's supply-line needs.

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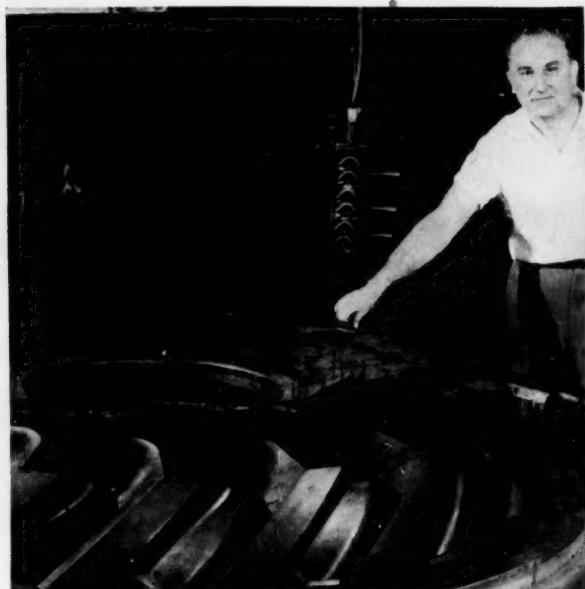
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RESEARCH



Reactions like the one that produces 'natural' synthetic rubber are a target of lithium research.

Active Metal Spurs Search for New Polymers

A new research project now underway at Princeton University may turn up some much-needed information on how lithium metal and its compounds function as catalysts. That's the hope, anyhow, of the sponsor—American Lithium Institute (Princeton, N.J.)—and the project's director, chemistry professor Arthur Tobolsky. If successful, the project might even lead to new, potentially profitable, lithium-catalyzed polymers.

This week, Tobolsky told *CW* he first plans to investigate "the fundamental mechanism behind the use of lithium alkyls and Lewis acids in the isotactic polymerization of propylene." That's virgin territory for lithium catalyst research—most of which has been in connection with elastomers.

As a matter of fact, much of the current industrial interest in lithium catalysis stems from Firestone Tire & Rubber Co.'s (Akron, O.) disclosure that metallic lithium (dispersed in petroleum jelly) is used to make its Coral "natural" synthetic rubber from isoprene. Coral rubber, like its natural prototype, is mostly *cis*-1,4-polyisoprene. And Firestone has filed

more than 70 patent applications in the U. S. and foreign countries relevant to its manufacture (*CW Technology Newsletter*, July 27).

To make the rubber, Firestone utilizes a unique lithium trait. Unlike its fellow alkali metals, lithium is a highly directive isoprene polymerization catalyst. The polymer product analyzes about 94% *cis*-1,4-polyisoprene. Sodium, potassium, rubidium, and cesium aren't that specific in their catalytic action, yield a variety of isoprene addition products (e.g., *trans*-1,4- and various -3,4- and -1,2- forms).

Still, no one is quite sure why lithium works the way it does. Lithium also exhibits its catalytic powers in organo metallic form. Recently, B. F. Goodrich researchers tried polymerizing isoprene with a series of alkyl lithiums ranging from methyl through *n*-dodecyl. In every case, the polymer produced was found to be mostly *cis*-1,4-polyisoprene. (The *cis*-polymer can also be made with isoprene and a Ziegler catalyst—alkyl aluminum-titanium tetrachloride.)

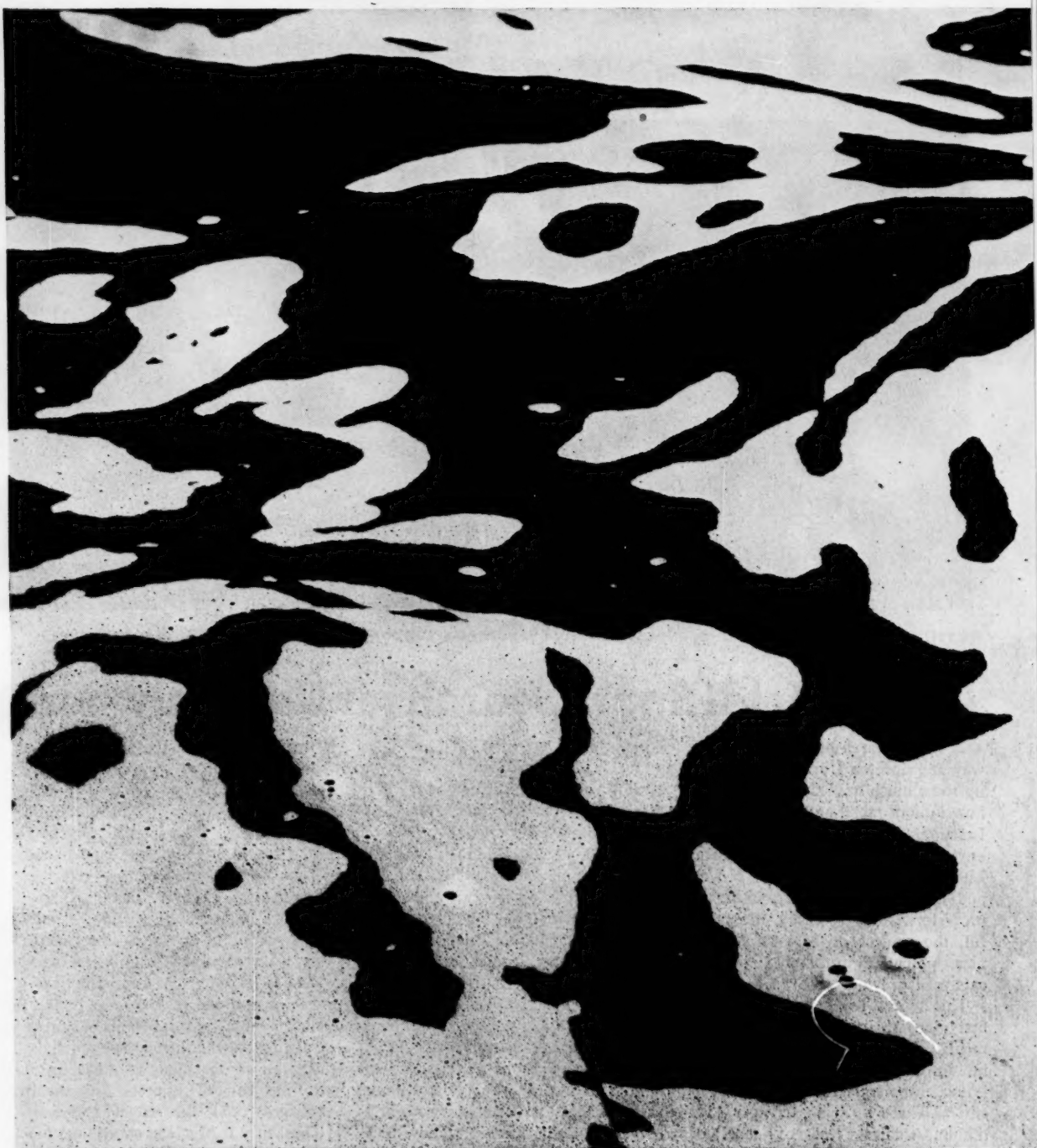
Need for More Knowledge: What would help immeasurably in the Princeton project, of course, is a better

understanding of the mechanism of the formation of stereospecific polymers. It's been the subject of a lot of research and a lot of discussion. And although there are still some areas that are not completely understood, Tobolsky and his colleagues feel they are making headway there.

For instance, an anionic polymerization in homogeneous media proceeds this way: the metal alkyl dissociates into the metal and alkyl groups and the alkyl group adds to the monomer (isoprene) to start a growing polymer chain. The propagating end of the chain is made up of an ion pair of isoprene (negatively charged) and the metal (positive). Thus, they reason, the controlling factor in the catalyst is the metal group—rather than the alkyl—for the entering monomer is strongly influenced by the electrical and steric forces of the ion pair.

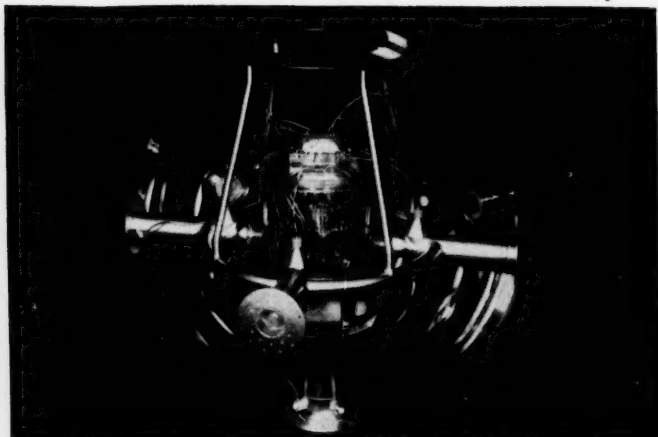
Also, since the solvent might thoroughly solvate or even complex one or both members of the ion pair, the nature of the solvent should be an important consideration.

Tobolsky and his co-workers were able to prove this in a series of ex-



3M Fluorochemistry produces a foam that can completely trap chromic acid rising in a plating bath. The result—long life for the bath solution, less hazard for workmen and, for you, high quality plating at a lower cost. **FLUOROCHEMICALS DIVISION**

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ARE COMING FROM 3M CHEMISTRY***



Out Of This World in the earth satellite, conventional insulating materials won't do. But KEL-F® plastic does deliver the low thermal conductivity, electrical insulation, strength, durability and chemical inertness required. In or out of this world, it offers unique performance for your product. JERSEY CITY CHEMICAL DIVISION

From the research laboratories and plants of 3M are emerging a host of imaginative new chemicals, including amazing fluorochemicals. As if by magic, they are transforming the products you make and use

Patterns shaping your future . . . they no longer explain themselves simply, like railroad tracks crossing the prairie.

Today, they're more complex, hidden beneath the eyepiece of a microscope, behind the symbols of chemical formulas, or embodied in new forms and textures we may scarcely recognize. Like the foam on a plating bath, the geometry of struts in an earth satellite, the outlines of rubber samples as they stretch, or the curves and hardness of a vacuum-forming mold.

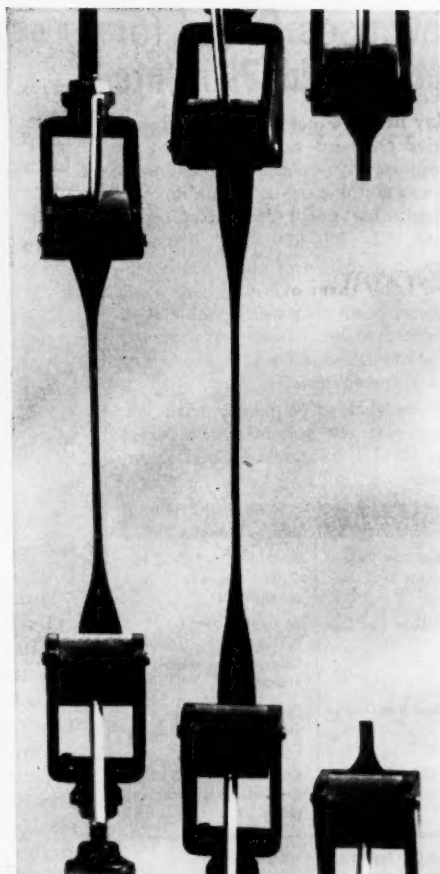
These patterns result from imaginative chemistry . . . from these four new 3M chemicals that are revolutionizing processes and materials you are familiar with . . . electroplating, plastics, rubber and tooling resins.

And they are but four among dozens of equally significant chemical specialties developed and produced by the Chemical Products Group of Minnesota Mining and Manufacturing Company. Look to 3M research for radically new chemical products that can set new patterns of performance and profit in your industry. For information contact: Chemical Products Group, 3M Company, Dept. WE-107, St. Paul 6, Minnesota.

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Tension Reveals the lasting flexibility non-leachable TURPOL® NC-1200 gives to rubber. Even after soaking in solvent, rubber softened with this 3M chemical (center) stretches far more than unsoftened rubber (left). Yet it does not break like rubber softened with vulcanized vegetable oils. (right). IRVINGTON CHEMICAL DIVISION



Vacuum-Formed parts of almost any size can be fabricated now, thanks to HC-111. You make tools of this 3M compound by soaking resin into pre-forms made with catalyst-coated particles. You eliminate the weighing, mixing, pot-life and toxicity problems of conventional plastic tooling materials. HASTINGS CHEMICAL DIVISION

New uses found for Metallic Oxide Pigments

Today new product planners and production engineers are finding uses for the unique physical and chemical properties of metallic oxides which are surprisingly far afield from traditional usages.

Below is a review of their characteristics. Look them over. You may get the germ of an idea which will lead to the improvement of existing products . . . or to the reduction of new product manufacturing costs.

We'll be glad to cooperate with you in exploring the possibilities. Address Dept. 20, C. K. Williams & Co., Easton, Penna.

Name	Properties
Pure Red Iron Oxides and Kroma Reds	Fe ₂ O ₃ -98.5% SpG.-5.15 Color—Salmon to purplish red
Pure Yellow Iron Oxides	Fe ₂ O ₃ .H ₂ O-99% SpG.-4.03 Color—Lemon to dark orange
Pure Black Iron Oxides	Fe ₃ O ₄ -96% min. SpG.-4.96 Color—Blue Black
Pure Chromium Oxides (and Hydrates)	Cr ₂ O ₃ -99% SpG.-5.20 Color—Light to dark green
Natural Oxides—Ochers, Umbers, Siennas, Metallic Browns, Red Oxides	Wide range of ferric oxide content and red, yellow and brown colors
Venetian Reds	Fe ₂ O ₃ -40% SpG.-3.45 Color—Light to med. red
Cuprous Oxide	Cu ₂ O-97% min.
Extenders—Barytes, Calcium Carbonate, Calcium Sulfate, Silica	Wide range

Characteristics

Composition: The basic colors of the iron and chromium oxides are determined by chemical composition. Reds are ferric oxide (Fe₂O₃); yellows, hydrated ferric oxide (Fe₂O₃.H₂O); blacks, ferro-ferric oxide (Fe₃O₄); and greens, chromic oxide (Cr₂O₃). All these compounds are chemically stable and light permanent.

Particle Shape: Physical properties such as oil absorption and suspension characteristics are dependent on particle shape, controlled by manufacturing processes.

Size: Color range is controlled by particle size—average size increases as color darkens. Uniformity of size determines brightness.

Purity: Freedom from impurities is essential for superior pigment properties and to prevent deleterious effects in end-products. Control of soluble salts, manganese and copper content are an important part of the Williams manufacturing operation.

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RESEARCH

periments. They found that large variations in structure of the polymer can be obtained through use of different metal ions or through the choice of solvent. Temperature and alteration of the alkyl group, on the other hand, had only minor effects.

Common Intermediate: The Princeton researchers have also gained an insight into the mechanism of lithium catalysis through a series of experiments comparing the action of lithium metal with that of lithium alkyls.

They discovered that when the polymerization of isoprene is carried using lithium dispersions, results are substantially similar to those obtained when lithium alkyls are used in hydrocarbon solvents. In either case, the polymer formed is mostly the *cis*-1, 4 structure.

But if the polymerization takes place in tetrahydrofuran solutions of isoprene using lithium dispersions, mostly 3,4 and 1,2 structures are obtained. That's also true if *n*-butyl, *n*-amyl or iso-amyl lithium are used in the isoprene-tetrahydrofuran system. So Tobolsky sees a strong argument for the belief that both types of lithium catalyst have some intermediate in common—such as the lithium metal first forming an alkenyl with the isoprene.

There's lots of research ahead, however, before the precise action of lithium catalysts can be delineated. And even if this knowledge leads to new polymers, the economics of lithium catalysts needs further study. (At around \$10/lb., lithium must be used sparingly, despite its unique properties). Furthermore, lithium-induced polymerizations will have to be more reproducible than they are now. Nevertheless, the metal's safety and ease of handling should bolster its prospects as a catalyst of the future.

LITERATURE

• The Institute of Gas Technology (Chicago) now offers "Fundamentals of Combustion of Gaseous Fuels—A Critical Literature Review," which covers theory of combustion, combustion phenomena, and experimental work. Price: \$5.

• "Bibliography of Research on Deuterium and Tritium Compounds 1953 and 1954" lists 720 published articles on the properties of deuterium

and tritium, may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. (National Bureau of Standards Cir. 562, Sup. 1, 31 pages, 25¢).

• More than 100 S-35 and P-32 radioactive chemicals are listed in a new catalog by Volk Radio-Chemical Co. (Chicago).

EXPANSION

• Courtaulds Inc. (Lemoyne, Ala.), subsidiary of British rayon producer Courtaulds Ltd., has opened a \$1-million laboratory for research in fiber chemistry, blending and physical testing.

• Hooker Electrochemical Co. (Niagara Falls, N.Y.) is laying the foundation for its new \$3.5-million research center at Grand Island, N.Y., estimates construction will be completed in a year and a half.

• Sterling Winthrop Chemical Institute (Columbia Turnpike, N.Y.) is adding a \$250,000 drug pilot-plant laboratory to its facilities.

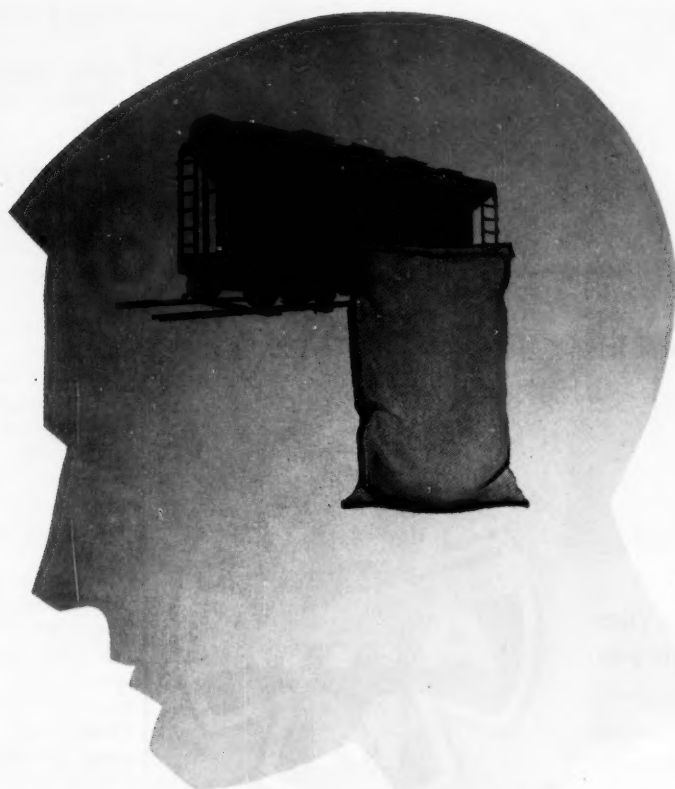
• Canada's Dept. of Agriculture has completed a new \$650,000 research lab at the University of Manitoba. First project: combating grain rust spores.

CHEMICALS

Alcohol Entries: 2, 2-dimethylpentanol is now available in research and pilot-plant quantities from Eastman Chemical Products, Inc. (Kingsport, Tenn.). Suggested uses: as a terminating agent for polyesters and in other reactions where stability to dehydration is a problem. Eastman also offers the corresponding aldehyde.

• Food Machinery and Chemical Corp. (New York) is offering developmental quantities of methallyl alcohol (2-methyl-2-propene-1-ol). The compound can take part in polymerizations, is also a reactive intermediate for making methallyl derivatives. Possible uses: in synthesis of adhesives, protective coatings, molding powders, specialty rubbers, etc.

• **Rare Chemicals:** Methionine sulfone, methionine sulfoxide, α -methyl methionine, oxythiamine HCl, α -ketobutyric acid, and 4-ethoxypyrimidine-2 (4-ethoxy-2-hydroxypyrimidine) are now available in rel-



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Write for other suggested uses and more detailed information.

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RESEARCH

actively large-scale quantities from Chemicals Procurement Co. (New York).

Scale-up: Beacon Chemical Industries, Inc. (Cambridge, Mass.), is now offering extremely pure pyridine N-oxide in commercial quantities. The compound can be used to make such derivatives as carbostyryl, 3- and 4-hydroxypyridine, 2- and 4-chloropyridine, and 4-nitropyridine-N-oxide. The last is useful in the manufacture of pharmaceuticals, dyestuffs. The firm will also now supply 2-, 3- and 4-picoline-N-oxides and trimethylamine-N-oxide in commercial lots, has other amine-N-oxides and their derivatives under development.

Insecticide: Union Carbide Chemicals Co. (division of Union Carbide Corp.) has developed a new insecticide that is said to be effective against several insect strains that have developed resistance to other insecticides. Called Sevin, it is 1-naphthyl N-methyl-carbamate.

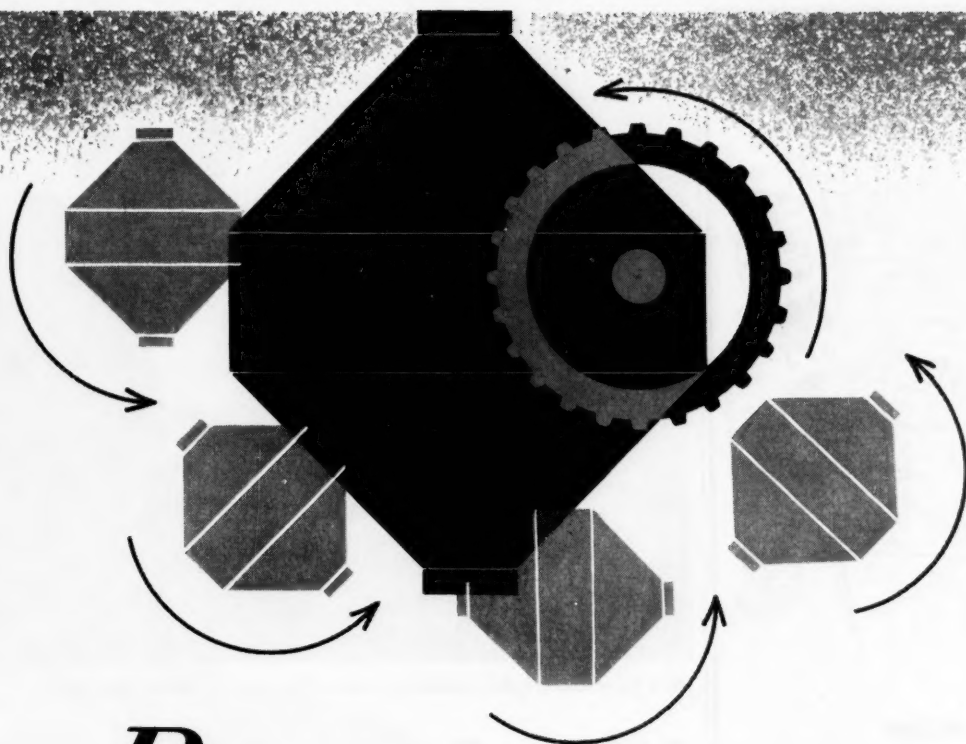
PVP Entry: Stein, Hall & Co., Inc. (New York), now offers trial quantities of vinyl pyrrolidone polymers and copolymers for evaluation in adhesives, cosmetics and coatings.

New Derivative: Pilot-plant quantities of 2,5-dihydroxybenzoquinone are available from Eastman Chemical Products, Inc. (Kingsport, Tenn.). Suggested uses: polymerization inhibitor, coupling agent, tanning agent, and intermediate for synthesis of insecticides, fungicides, polymers, antioxidants and dyes.

Gas Adsorbents: A complete line of adsorbents for gas and vapor-phase chromatography is now available from Burrell Corp. (Pittsburgh).

Cosmetic Compound: Aceto Chemical Co. Inc. (Flushing, N.Y.) offers double-distilled isopropyl myristate, suggests it for use as an emollient, penetrant in cosmetic formulations.

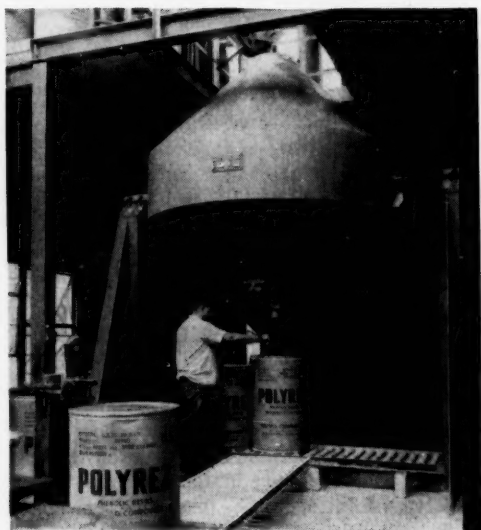
Halogenated Hydrocarbon: 2,2,3-Trichloroheptafluorobutane, a new chemical from Halocarbon Products Corp. (Hackensack, N.J.), is highly resistant to oxidation, nonflammable, nonpolar and nonconductive.



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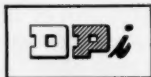
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RESEARCH



IIE's Lawson (right) machine-sorts foreign student listings.

Aiding Overseas Research

Conducting research on foreign soils holds attractions for U.S. chemical firms. But it poses problems too. One big one: finding and hiring technically trained foreign personnel who have an adequate understanding of the U.S. approach. Now the Institute of International Education thinks it has at least a partial solution.

A nonprofit institute, IIE has an IBM-tabulated list of 250,000 foreign students who have studied in the U.S. within the last 30 years. Most of the names, however, are of students who have matriculated within the last 10 years. And it's adding new names at a rate of 20,000/year.

The names on file, IIE reasons, would be a likely source of personnel to staff U.S. labs overseas. Information is filed by student's native country, date of arrival and major subject studied. On the roster are 3,343 students in chemistry and chemical engineering who graduated last year. For a "nominal fee"—which includes costs of putting the list together—the institute is making this information available to U.S. firms.

Each student's card records name, nationality, foreign address, school, education, sex, and means of support.

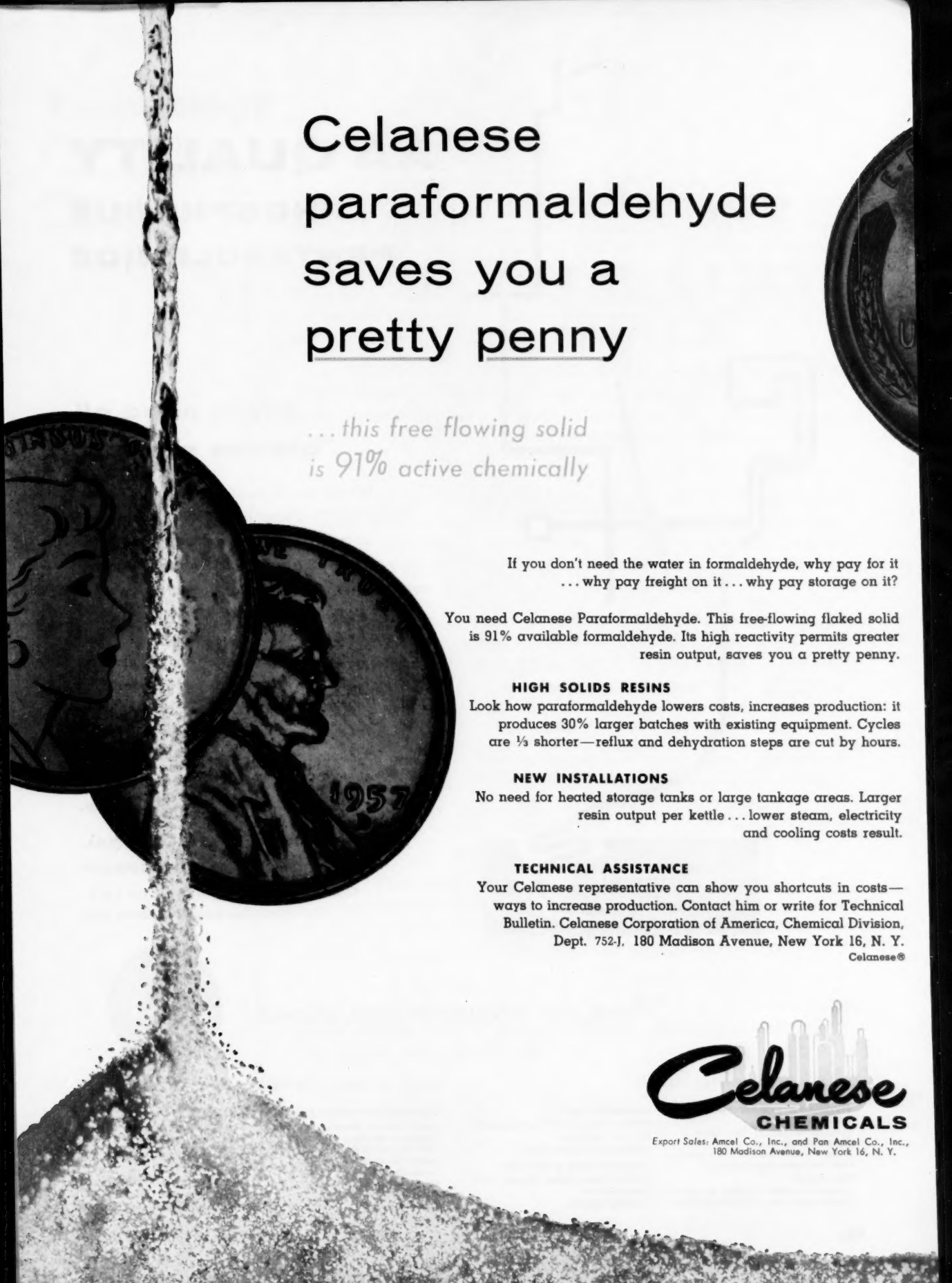
It wouldn't be quite accurate to say that U.S. chemical process industry

companies have beat a path to the institute's door. But companies such as Pfizer, Du Pont, Monsanto, Vick Chemical, W. R. Grace and Standard Oil of New Jersey have already been in to see David Lawson, chief of the statistical service division. Some have come only to inquire, others to purchase lists. But Lawson says the demand is growing each day.

In fact, the organization is so well satisfied with its reception that it plans to expand its services. From now on, the list will include the student's own preference regarding employment and his final academic standing. It's also selling a booklet (price: \$1) listing all the students by college, country and major subject for each school year.

The institute lists these advantages of operating in foreign countries: a fresh approach that can sometimes yield profitable ideas; lower costs; better overseas patent coverage and control; and fewer communications problems with foreign customers.

U.S. industry is aware of these potential benefits. But so far, most firms have chosen to conduct their overseas research through alliances with foreign research and industrial organizations (*CW*, Jan. 2, '54, p. 48; May 14, '55, p. 48). New help in staffing their own labs abroad might alter this trend.



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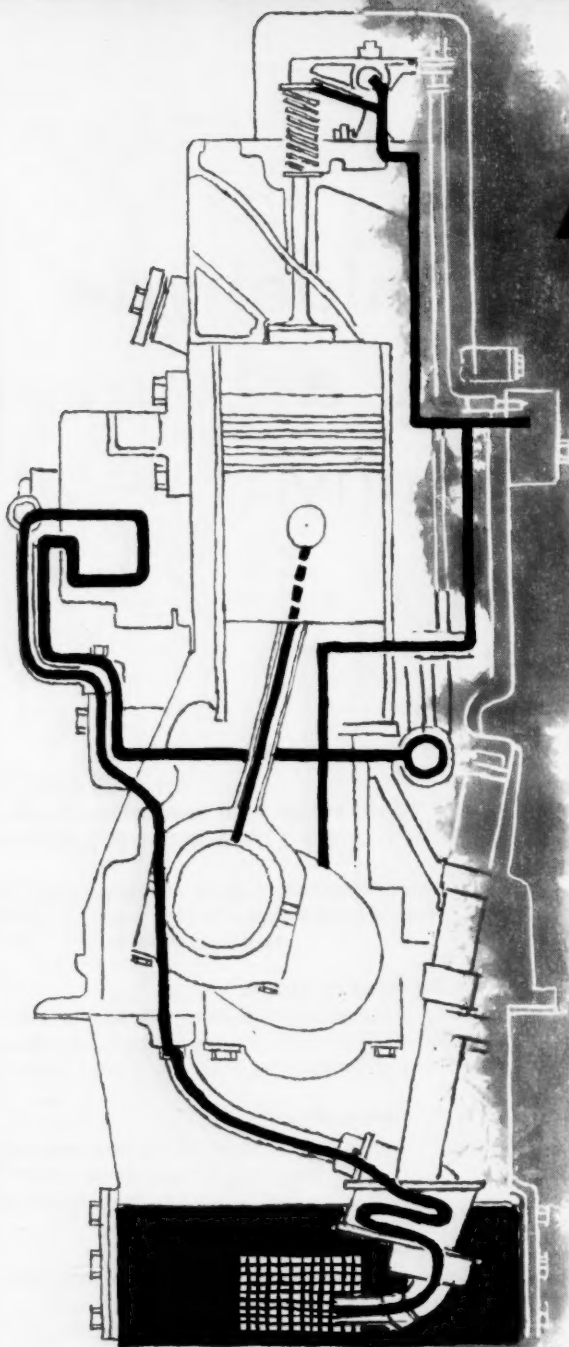
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Technology

Newsletter

CHEMICAL WEEK
October 26, 1957

High-purity columbium is now available from Electromet. It's the highest purity that has ever been "commercially available," the firm reports. [Westinghouse, which uses cage-zone melting (*see p. 88*), lays claim to the highest purity columbium that has ever been made on a scale large enough for "realistic scientific study."] The metal, of course, is winning a lot of notice for its performance in nuclear reactors because of its low neutron cross-section and in high-temperature alloys because of its medium density and high-strength at elevated temperatures.

Electromet pegs the purity of its metal as a lot higher than that of reactor-grade columbium. The metal, in roundels, will cost from \$55-70/lb.; pressed electrode segments are priced at \$60-75/lb. and rough ingots up to 4-in. diameter and 60 lbs. will sell for \$65-80/lb.

Dow has four new ultraviolet absorbers: Salol (phenyl salicylate), TBS (tert-butyl phenyl salicylate), HCB (5-chloro-2-hydroxybenzophenone) and DBR (dibenzylresorcinol). It reports that all four are being used in commercial plastic formulations but that only Salol has been sold previously to the trade.

Substituted benzophenones are the basis for presently commercial uv. absorbers made by General Aniline & Film (Uvinuls) as well as Cyanamid's M-40 absorber. Dow's interest in the resorcinol derivative had been clear from an Australian patent application issued to the firm (*CW, May 4, p. 40*).

A new estrogenic hormone has been isolated from a plant source by researchers at the USDA's Western Utilization Research and Development Division at Albany, Calif. The hormone, named coumestrol, was found in Ladino clover, but is known to exist in alfalfa and strawberry clover, too.

The new hormone differs from any estrogen—animal or plant—that's been uncovered to date. It has about 30 times the activity of genistein, one of the most potent previously reported in forage crops. But it is considerably less potent than stilbesterol when administered to animals.

Not too much is known about the action of hormones in plants. But it has been established that animals that feed on forage containing excess estrogens show a decrease in fertility; still-births or early deaths are common among their young.

A British proposal to pool nuclear and rocket research with the U. S. is definitely shaping up. Prime Minister Macmillan is taking three top nuclear policy planners to his conference with President Eisenhower

Technology Newsletter

(Continued)

this week: Sir Richard Powell, permanent secretary of the Defense Ministry; Sir Edwin Plowden, chairman of Britain's Atomic Energy Authority; and Sir Patrick Dean, a deputy undersecretary of the Foreign Office charged with political aspects of the Atomic Energy Authority.

On Monday, Macmillan met with his cabinet, reportedly to propose the research pool.

You can expect to hear about a new mothproofing approach, probably sometime next year. Great strides in that direction have already been made, of course. But a Midwest firm has just developed what it feels is a "new concept," will start test-marketing and market development early in '58. The new treatment for fabrics, it says, is stable, odorless and non-toxic.

"Large-scaled experimental devices for thermonuclear reactors" will be designed and fabricated by Allis Chalmers and Radio Corp. of America at Princeton's James Forrestal Research Center. That's the word this week from Princeton, which is negotiating a contract with the two firms. Part of Project Matterhorn—one phase of the Atomic Energy Commission's over-all program to control fusion reactions—the new project will center around Model C Stellerator.

But it will not result in a pilot-plant or prototype unit; it will be aimed to facilitate experimental work that can't be done adequately with smaller models.

A new agent for controlling coccidiosis in chickens is being made available by Sterwin Chemicals this week. Tagged Trithiadol, it's a synergistic combination of bithianol and methiotriazamine. It has passed tests on 200,000 chickens and Sterwin feels it is safer and more efficient than anything now on the market. The firm says, too, that the new combination not only prevented the development of the disease but also enabled growers to raise broilers to market weight at a lowered feed cost and permitted birds grown as replacement flocks to develop immunity.

Progress note on the high-energy fuels program: bids on a big general construction contract for the \$36-million borons-fuel plant that Olin Mathieson is building for the Air Force (*CW*, July 20, p. 35) are scheduled to be opened Oct. 29.

Now there's a solar-powered clock. It was presented to the city of Palm Springs last week by Hoffman Electronics Corp. Approximately 20 silicon solar cells, placed around the face of the clock, convert solar energy into electricity to run the clock.

Atlantic

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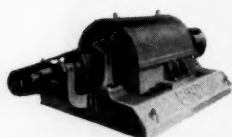
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****STEP 2:**

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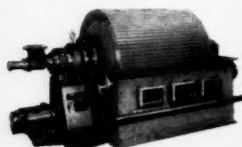
***BIRD BUILDS**



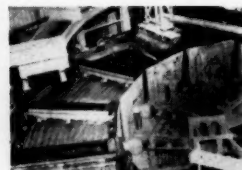
Bird Continuous Solid Bowl Centrifugal Filters



Bird Continuous Screen Type Centrifugal Filters



Bird-Young Continuous Rotary Single Cell Vacuum Filters



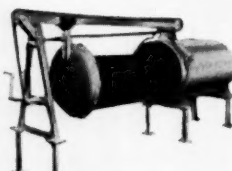
Bird-Prayon Horizontal Tilting Pan Vacuum Filters



Bird-Humboldt Oscillating Screen Centrifugals



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MACHINE COMPANY

Alkaline Leach Gets More Uranium Work

The uranium industry's current plans to more than double its capacity by the end of '58 (CW, Sept. 7, p. 83) clearly indicate a trend to wider use of the carbonate process for the leaching of uranium ores. With more than a third of the now-planned or under-construction capacity slated to use alkaline leaching, uranium oxide produced by this method will jump from its present 10.8% of total production to 25.1% by the end of '58.

Chiefly responsible for the swing to carbonate are recent improvements in alkaline leaching techniques and, to a lesser degree, the increase of uranium ores of high limestone content. Though the latter necessitate the use of an alkaline leach (acid consumption would exceed economic limits), they account for only a relatively small proportion of the uranium ore produced.

At present, only two mills employ the carbonate leach: The Anaconda Co. (Grants, N. M.), for about 25% of its 3,000-tons/day capacity; the government-owned, National Lead-operated plant at Monticello, Utah. The latter is rated at 600 tons/day, but is reported to be producing only about one-third that amount.

Leading the swing to alkaline leaching are three of the largest of the new mills—one by Phillips, two by Homestake (*see table*)—having a combined capacity of 3,975 tons/day of ore. The largest mill planned—Kermac Nuclear Fuels Corp. (Grants, N. M.)—also considered using carbonate for its 3,300-tons/day operation, but now appears to favor the acid process.

Advantages of Alkali: The choice between acid and carbonate leaching processes depends on a number of factors, e.g., the type of ore being processed, supply and consumption of leaching chemicals, compatibility with subsequent uranium recovery operations. And though the carbonate process is most advantageous for treatment of high-limestone ores, that's not its only qualification.

Sodium carbonate, in addition to low cost, high solubility and stability, possesses selectivity for dissolving uranium minerals while attacking few of

Existing and planned uranium mills*

Company
location

Tons/day of ore treated by:
Acid leaching Alkaline leaching

Existing Mills

The Anaconda Co. Grants, N. M.	2,250	750
Uranium Reduction Co. Moab, Utah	1,500	
Union Carbide Nuclear Co. Uravan, Colo.	1,100	
Rifle, Colo.	280	
Vanadium Corp. of America Durango, Colo.	430	
Naturita, Colo.	350	
Vitro Uranium Salt Lake City, Utah	550	
Kerr-McGee Oil Industries Shiprock, N. M.	500	
Climax Uranium Grand Junction, Colo.	350	
Mines Development Co. Edgemont, S. D.	300	
Rare Metals Corp. of America Tuba City, Ariz.	250	
U. S. AEC (operated by National Lead) Monticello, Utah		200†
Total capacity of existing mills	7,860	950
Percent of total leached	89.2%	10.8%

Mills currently under construction or planned

Kermac Nuclear Fuels Corp. Grants, N. M.	3,300	
Homestake-Sapin Partners Grants, N. M.		1,500
Homestake-New Mexico Partners Grants, N. M.		750
Phillips Petroleum Co. Grants, N. M.		1,725
Union Carbide Nuclear Co. Rifle, Colo.	1,000‡	
Texas-Zinc Minerals Co. Mexican Hat, Utah	775	
Lucky Mc Uranium Corp. Fremont Co., Wyo.	750	
Dawn Mining Co. Ford, Wash.	400	
Western Nuclear Corp. Split Rock, Wyo.	400	
Trace Elements Corp. Maybell, Colo.	300	
Gunnison Mining Co. Gunnison, Colo.	200	
Total capacity of planned mills	7,125	3,975
Total estimated capacity by end of '58	14,705‡	4,925
Percent of '58 total leached	74.9%	25.2%

*Source: AEC semiannual report for Jan.-June '57.

†Rated capacity of government-owned Monticello mill is 600 tons/day.

‡New mill will replace existing 280-tons/day mill at Rifle, Colo. Thus, estimated '58 capacity is 280 tons less than total of existing and planned facilities.

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ENGINEERING

the other ore components. This selectivity minimizes reagent consumption, permits good over-all recovery of high-grade uranium solutions containing a minimum of impurities. And because the carbonate leach is less corrosive than an acid medium would be, plant investment is lower, mill operating and maintenance costs are estimated to be less.

Furthermore, carbonate reagents can be regenerated, after the precipi-

tation and separation of uranium as sodium diuranate, and returned to the leaching cycle. Here's how the process works:

Uranium ore is crushed and ground to a size that's fine enough to permit thorough dissolution of uranium minerals in the leaching solution. Because the carbonates attack few of the nonuranium ore constituents, the ground ore must usually be finer than that required for an acid leaching



Columbium Gets a Hot Shot

The white-hot object above is a bar of columbium (niobium) on its way to what is described as the highest level of purity yet reached for the material. A process developed by Westinghouse Research Laboratories reportedly removes all but the last traces of impurities in the metal, which is becoming increasingly important for high-temperature applications. The refining method—known as "cage zone melting"—uses the metal as its own container during purification. It's done by standing a rectangular bar of the metal on a platform and passing it through

a strong electrical field. The metal melts radially from the center, leaving the corners of the bar to serve as a holder for the molten zone. Columbium would pick up impurities from any other type of container at the temperature reached in the zone: 4400 F. The material obtained is to be used in further research on columbium's properties. The metal is receiving considerable attention for structural applications at temperatures above 1800 F. Although not new itself, "cage zone melting" hasn't previously been applied to columbium.



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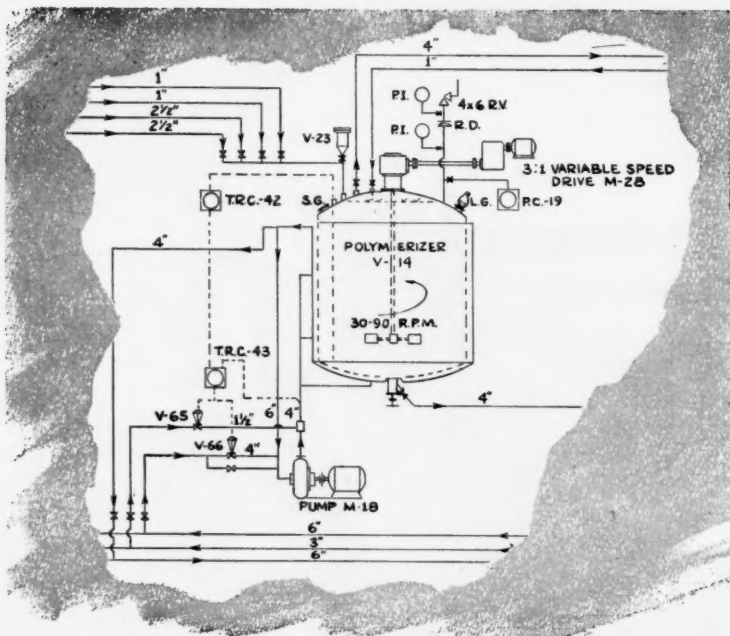
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process. The finely ground ore may then be treated to increase the solubility of the contained minerals (e.g., high-vanadium, carnotite-type ores are salt-roasted to increase recovery of vanadium), or transferred directly to the leaching stage.

Raw ore, consisting chiefly of highly oxidized (hexavalent) uranium compounds, can be leached satisfactorily at atmospheric pressure. Most primary ores or those containing large quantities of tetravalent uranium, on the other hand, must be leached under pressure—in the presence of an oxidizing agent—to convert uranium values into the soluble hexavalent form.

The leaching solution is a mixture of carbonate and bicarbonate, the latter being required in small amounts to neutralize hydroxyl ions that would otherwise cause precipitation of insoluble uranates. After complete dissolution of uranium values, caustic is added in order to, first, neutralize the bicarbonate, then to precipitate sodium diuranate. (Vanadium-bearing leach liquors are treated with acid to precipitate sodium uranyl vanadate, which requires further processing for the separation of uranium and vanadium values.)

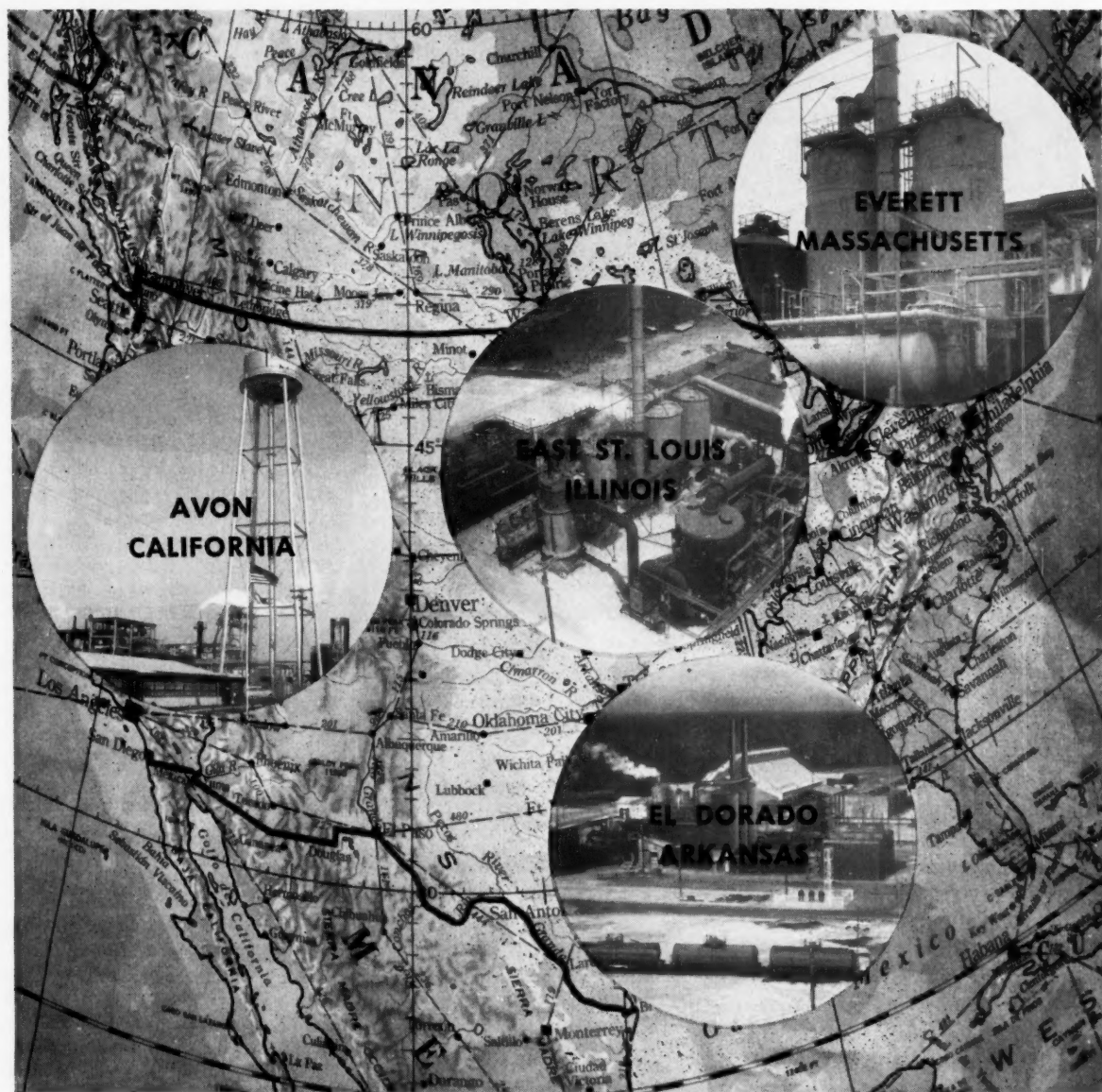
Following removal of uranium precipitates by filtration, the barren leach liquors may be recarbonated with carbon dioxide from flue gas or from the roaster—if one is used for preparing the ore. In this way, about half of the carbonate makeup can be recovered from the NaOH remaining in the barren liquor.

Oxidation is the Key: In the leaching of unoxidized uranium ores, some means of changing uranium from a valence of four to a valence of six is vital to the economic recovery of mineral values in high yield. Air is the cheapest oxidant and is quite satisfactory if the leaching units are sufficiently large to permit relatively long holdup leach batches. (Air oxidation at atmospheric pressure may take as long as 48 hours.) In plants equipped with pressurized leaching autoclaves, air oxidation can be shortened by agitating the solution under pressure.

From the standpoint of speed, oxidation with strong chemical oxidizers can substantially reduce leaching time, but adds to reagent costs. Potassium permanganate has been used in several carbonate leaching processes, is gen-

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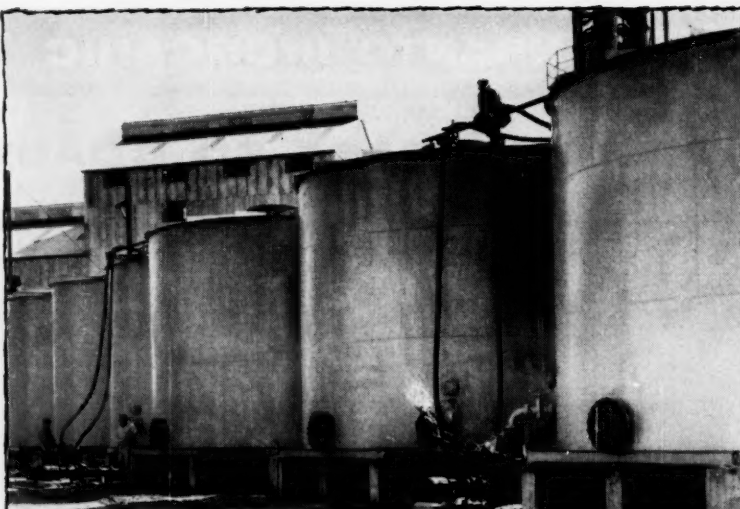
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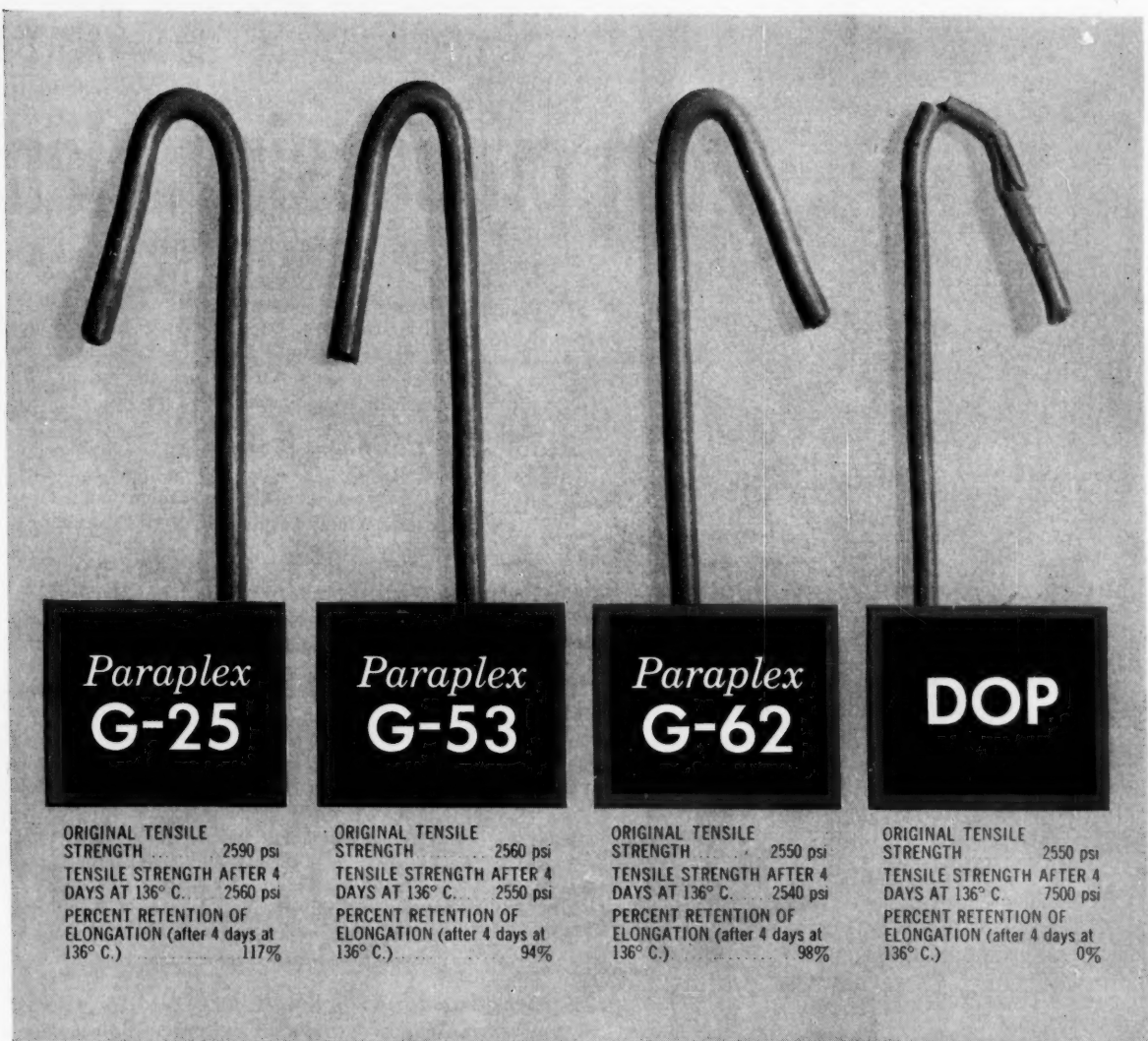
erally accepted as the most effective oxidant for processes in which leaching speed is the criterion. However, a new copper-ammonia catalyzed air oxidation, currently undergoing pilot-plant investigations at Grand Junction, Colo., shows promise of doing the job at about half the cost of the permanganate method.

The copper-ammonia catalyzed oxidation was turned up by Arthur D. Little's Western Laboratories (San Francisco) in an exploratory study of air oxidation catalysts. ADL found $\text{Cu}^{++}\text{-NH}_3$ more efficient than permanganate from the standpoint of reagent cost and leaching time, recommended that the method be piloted. National Lead confirmed ADL's findings, ran additional bench-scale tests at Winchester, Mass., and is now in the second month of pilot-plant trials in a 20-tons/day unit at Grand Junction.

Though it's termed a catalyst, the copper-ammonia reagent actually takes part in the reaction by which the tetravalent uranium ion is converted into a hexavalent uranium ion. However, the catalyst is regenerated by the air and is not consumed as is the permanganate used for the same purpose. This reaction-regeneration cycle also accounts for the economy of the copper-ammonia reagent, since the small quantity required remains in the solution throughout the leaching cycle.

Some other processing modifications that may enhance the usefulness of carbonate leaching are new methods of recovering uranium from the leach solution. Though conventional precipitation has the advantages of being simple to operate and of using readily available caustic soda, a number of alternate routes have been investigated. Uranium Reduction Co. (Moab, Utah), for example, is reportedly considering a switch from acid- to alkaline-RIP (resin-in-pulp) ion exchange. And ADL has been working for some time on a solvent extraction process for recovering carbonate-leached uranium. (*CW*, March 30, p. 73).

The new activity in alkaline leaching processes—plus the growing production of high-limestone uraniferous ores—seems fair assurance that the carbonate process will continue to be a useful complement to the acid-leaching and solvent-extraction processes in uranium oxide production.



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Acetylations—of alcohols or amines with acetic acid, acetic anhydride or ketene to give such compounds as esters, amides and anilides. The use of acetic anhydride and ketene are particularly useful with heat-sensitive compounds.

Aldol Type Condensations—with aldehydes, ketones, or both, to produce such compounds as acetaldol, butyraldol, diacetone alcohol and 2,2-bis(hydroxymethyl) butyraldehyde (trimethylolpropane intermediate).

Anhydride Formation—of symmetrical or mixed anhydrides by reaction of acetic anhydride with various organic acids.

Dehydrations—of aldols and ketols catalytically or thermally to give such compounds as crotonaldehyde, mesityl oxide and isobutylidene acetone.

Dehydrogenations—of primary or secondary alcohols in liquid or vapor phase reactions to give, as examples: acetaldehyde, propionaldehyde, acetone, methyl ethyl ketone, and methylhexyl ketone.

Esterifications—of solids or liquids, saturated and unsaturated, mono- or polyhydric alcohols, and mono- or polybasic acids have been esterified.

Hydrogenations—up to 2000 p.s.i.g. and 250°C. with various catalysts. Partial, selective hydrogenations of unsaturated aldehydes to saturated aldehydes such as 2-ethylhexenal to 2-ethylhexanal, and crotonaldehyde to butyraldehyde, have been carried out, along with experimental work on reducing the aldehyde group without hydrogenating the double bond, to give such compounds as allyl and crotyl alcohols. Complete reductions of aldehydes and unsaturated compounds have also been carried out to make butyl alcohol, 2-ethylhexanol, and isocaproic acid from 4-methylpentenoic acid. Hydrogenations are also valuable in up-grading materials with undesirable unsaturation or color.

Oxidations—of saturated and unsaturated aldehydes, alcohols and aromatic compounds catalytically with air to give acids containing no inorganic products other than catalysts. Examples are the preparation of acetic, butyric, 2-ethylhexanoic, crotonic, benzoic, toluic and phthalic acids.

MARKETS

Major U. S. Magnesium Oxide Producers

Company	Plant Location	Source	Capacity (thousand tons/year)
Basic Refractories	Gabbs, Nev.	Ore	80
Dow	Freeport, Tex.	Seawater	18
Harbison-Walker	Ludington, Mich.	Brine	70
International Minerals	Carlsbad, N.M.	Ore	10
Kaiser Chemicals	Moss Landing, Calif.	Seawater	135
E. J. Lavino	Freeport, Tex.	Seawater	50†
Merck	South San Francisco, Calif.	Seawater	14
Michigan Chemical	St. Louis, Mich.	Brine	15
Northwest Magnesite‡	Cape May, N.J.	Seawater	108
	Chewelah, Wash.	Ore	180
H. K. Porter	Pascagoula, Miss.	Seawater	53*
Standard Magnesia	Gabbs, Nev.	Ore	40
Standard Lime	Manistee, Mich.	Brine	27
Westvaco	Newark, Calif.	Seawater	50

* Due onstream in '58.

† Due onstream in '59.

‡ Subsidiary of Harbison-Walker.

Muddle in Expanding Magnesia Market

Is the U.S. magnesium oxide industry heading into overcapacity? Answers from industry experts this week range from emphatic denials of even moderate overcapacity in the near future to equally unequivocal warnings of impending overabundance.

One reason for the disagreement: most producers view the magnesia market situation primarily in terms of their own limited areas of interest, rather than in context of the industry as a whole.

But some magnesia producers are now learning that they no longer sit safely on impregnable islands of "spe-

cial markets." Other producers are eyeing these markets, seeking outlets for new capacity, or markets to replace old ones that are now petering out.

Lines of demarcation between various market areas of the magnesia industry are showing distinct signs of softening—which can mean only that competition will henceforth be felt on a much broader scale.

That magnesia marketers are becoming increasingly aware of this trend is evidenced by the current intensive hunt for accurate market data by many oxide producers. Here's

how industry and government magnesia oxide experts size up the situation.

Capacity Climbs: U.S. production capacities* for both chemical and refractory grades of magnesia are increasing. But the major capacity boosts—recently completed or now on the way—are aimed primarily at increasing the output of refractory material.

Due onstream in the second quarter of '58, for example, is H. K. Porter's

*Individual plant capacities (chart above) are maximum figures given by producers who often actually express such data as ranges, e.g., Kaiser, 120-135,000 tons/year; Merck, 10-14,000; Michigan, 12-15,000; Standard Magnesia, 36-40,000.

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MARKETS

U. S. Consumption of Magnesia*

(tons)

	1955	1956	Percent change
Caustic-calcined:			
Oxychloride and oxysulfate cements	12,155	11,363	-6.5
Rayon	1,430	1,065	-25.5
Fertilizer	358	710	+99.8
85% MgO insulation	3,933	3,551	-9.7
Rubber (filler and catalyst)	1,072	2,840	+165.0
Fluxes	**	**	
Refractories	1,430	—	
Misc. (including chemicals and paper)	15,373	15,979	+3.9
Approximate totals	35,752	35,509	-0.68

Technical and USP:

Rayon	3,085	3,359	+8.8
Rubber (filler and catalyst)	5,206	3,779	-27.5
Refractories	2,892	17,633	+510.0
Medicinal	1,350	420	-68.9
Uranium processing	386	1,260	+226.0
Misc. (industrial and chemical)	6,362	15,534	+144.0
Approximate totals	19,279	41,985	+118.0

* Based on U. S. Bureau of Mines data.

** Less than 1%.

Pascagoula, Miss., plant, with a designed capacity of some 53,000 tons/year of magnesia (company spokesmen say actual production may run 10% higher). Major part of the output will go into production of periclase (a crystalline magnesium oxide), which is used to make refractory bricks. Porter is also constructing a basic refractory brickmaking plant on a site adjacent to the new magnesia plant.

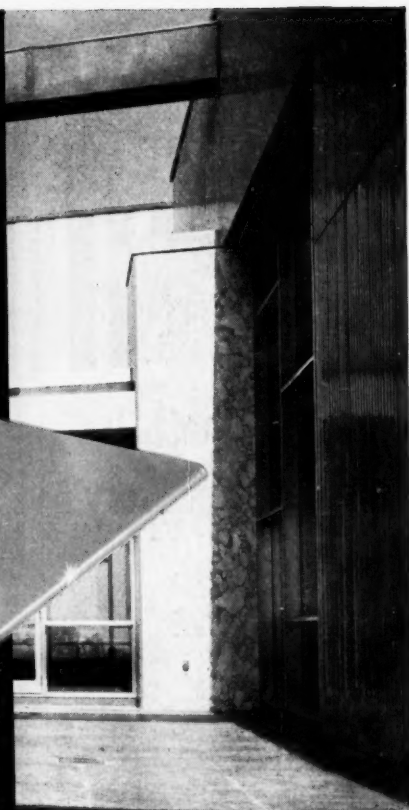
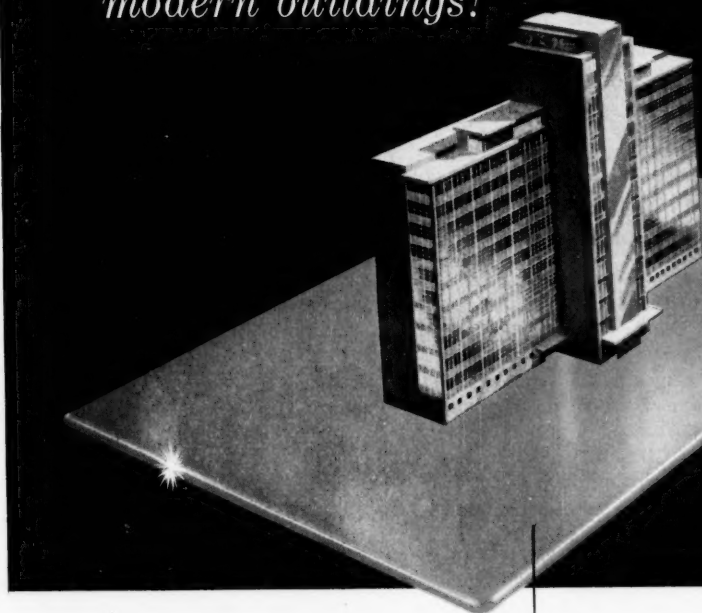
And another new 50,000-tons-a-year seawater magnesia plant will be constructed at Freeport, Tex., by E. J. Lavino (Philadelphia). Output, due in mid-'59, will be entirely for captive manufacture of periclase for

basic refractories. Westvaco—which has dropped its plans to build a new magnesia plant in the Texas Gulf area—will be technical consultant (no part-ownership is involved).

Harbison-Walker's new 200-tons-a-day magnesia plant at Ludington, Mich., went onstream in mid-'57. It is, in a sense, H-W's third magnesia plant, since the firm's subsidiary, Northwest Magnesite, already produces magnesia at Cape May, N. J., and at Chewelah, Wash. (Company spokesmen firmly deny trade reports that the Chewelah plant is only a marginal, part-time producer.)

Earlier this year, Kaiser Chemical completed an expansion of its sea-

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
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MARKETS

water magnesia plant at Moss Landing, Calif. Some 85% of the plant's output will consist of refractory-grade magnesia, and the remaining 15% will be chemical-grade material. Most of the refractory magnesia is slated for shipment to Kaiser's New Columbiana, O., plant, where it will be made into basic refractories such as bricks and mortars. These will find a major outlet in lining of open-hearth furnace bottoms.

Major portion of Kaiser's chemical-grade magnesia is reportedly destined for use by Northwest pulp and paper mills that use the magnesium bisulfite pulping process. (Magnesium hydroxide and oxide requirements of 33 Northwest pulp and paper plants amounted to 5,559 tons in '56 [CW, April 27, p. 106].)

According to recently published U. S. Bureau of Mines data,* 35,508 tons of caustic-calcined magnesia were used in the U.S. in '56 for these applications: oxychloride and oxysulfate cement, 32% of the total consumption; rayon, 3%; fertilizer, 2%; "85% magnesium oxide insulation," 10%; rubber (filler and catalyst), 8%; fluxes, less than 1%; miscellaneous applications—including chemicals and the paper industry, 45%.

The use of caustic-calcined magnesia in the manufacture of refractories, which took 4% of the total consumption in '55, is now apparently negligible, was not included in the '56 breakdown.

"Technical and USP" magnesia amounted to almost 42,000 tons in '56, went into the following end-uses: rayon, 8%; rubber (filler and catalyst), 9%; refractories, 42%; medicinal, 1%; uranium processing, 3%; miscellaneous industrial and chemical uses, 37%.

This Bureau of Mines data (first such information available from the agency in several years) must be used with caution; hasty comparison of the percentages from one year to the next could foster erroneous interpretations about consumption trends.

For example, 15% of the total consumption of "technical and USP" magnesia in '55 was for refractory uses; in '56, refractories took 42% of

the total consumption of these grades. But because the total tonnage used in '56 was close to 42,000 tons, compared with a little over 19,000 tons in '55, consumption of technical and USP oxide in refractory uses actually increased a whopping 510% in '56 (chart, p. 96). However, this huge increase was partly offset by a decline in the use of caustic-calcined oxide for this purpose.

In some cases, a cursory look at the Bureau of Mines data might suggest a consumption decline, when—in fact—the opposite is true. Case in point: the use of technical and USP oxide in rayon manufacture. According to the government data, this amounted to 16% of the total consumption of these grades of magnesia in '55. Only 8% of all technical and USP material consumed in '56 went into rayon manufacture.

But tonnage figures more clearly indicate the trend in consumption of magnesia by the rayon industry—3,085 tons were used in '55, 3,359 tons in '56—an increase of 8.8%.

Total U. S. consumption of all grades of magnesia by the rayon industry last year, however, actually declined. More than offsetting the gains in use of technical grades was the big 25.5% drop in use of caustic-calcined magnesia for this purpose. Total consumption of all magnesia in rayon manufacture in '56 amounted to 4,424 tons—about 90 tons less than in '55.

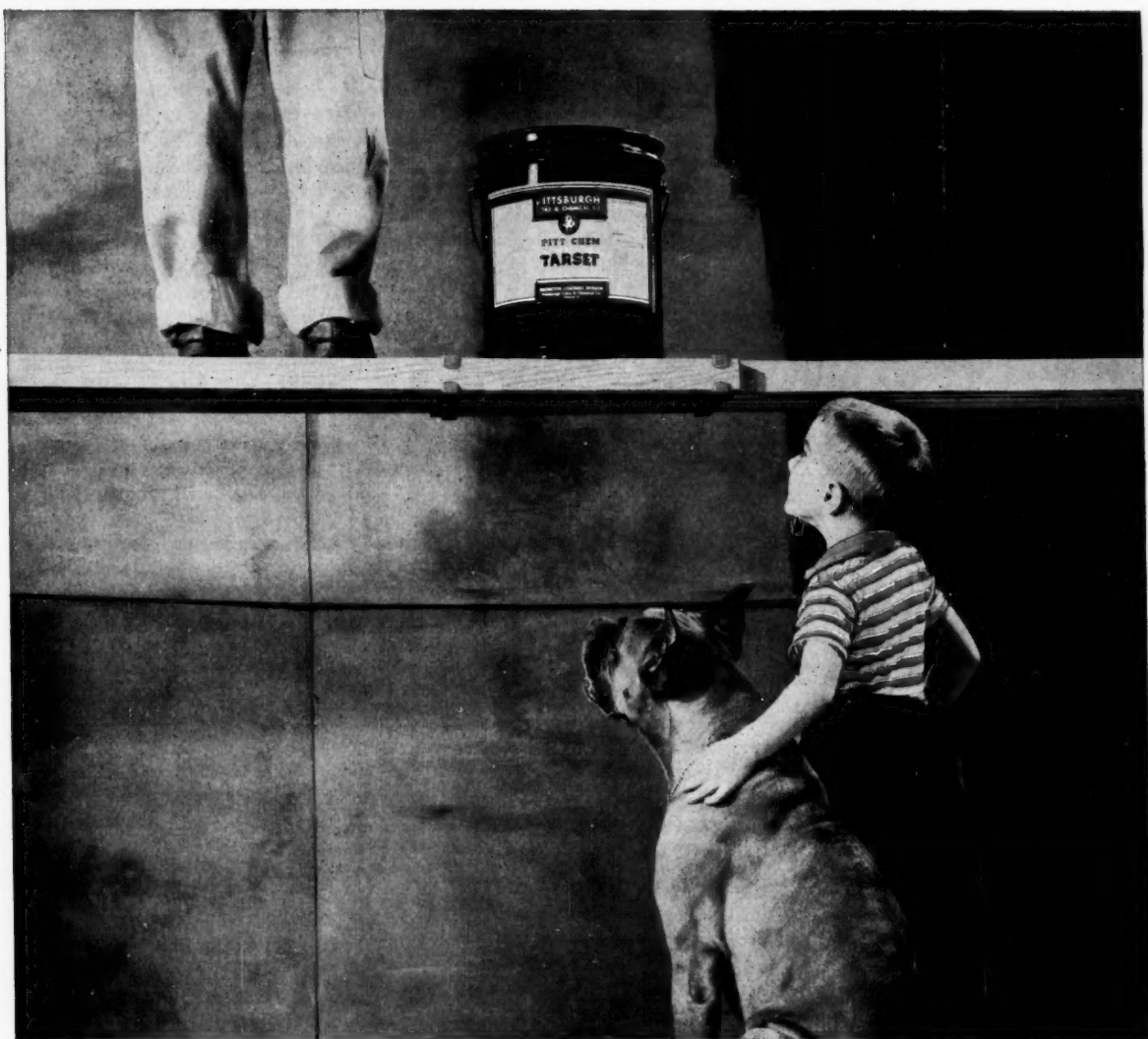
Consumption of caustic-calcined magnesia in other applications also slipped. Use in making "85% magnesium oxide insulation" dropped off 9.7% last year, compared with '55, thereby continuing the steady downward trend of the past few years. From a high of 5,593 tons of oxide required for this use in '53, demand dropped to a low of 3,551 tons last year. And the downward trend, say industry observers, will likely continue.

Consumption of caustic-calcined magnesia in the manufacture of oxychloride and oxysulfate cement also declined (some 6.5%) in '56, compared with '55.

Foggy Future: The Bureau of Mines does not attempt to predict trends of chemical usage. And in the case of magnesium oxide, forecasts by industry spokesmen are either hard to come by or, when available, usually disagree.

An example is the consumption of

*Mineral Market Report MMS No. 2669 (Magnesium Compounds—1956). In lieu of more specific end-use data, the combined classification of "technical and USP magnesia" is adhered to. Reference to this classification does not necessarily imply that both grades of oxide were used in every end-use mentioned.



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TENNESSEE'S line of top-quality chemicals includes: SODIUM BENZOATE • BENZOIC ACID • BENZYL CHLORIDE • BENZOYL CHLORIDE • BENZOTRICHLORIDE • BENZYL ALCOHOL • BENZYL BENZOATE • TENN-PLAS • BENZALDEHYDE • MURIATIC ACID • ACETIC ACID • METHANOL • BENZONITRILE • BENZOFLEX

MARKETS

magnesium oxide in the manufacture of special refractories (used in heating elements of stoves, industrial equipment, etc.). One industry estimate puts the '57 consumption of "chemical grade" magnesia for this purpose at 8,000 tons; another pegs use at only 3,600 tons.

If the Bureau of Mines breakdowns are considered more accurate, then both of these oxide producers are greatly underestimating the current demand for magnesia in special refractory uses. Government data indicate that such oxide consumption reached 17,633 tons in '56 (it was 4,322 tons in '55), and use will probably be significantly higher in '57.

Although accurate quantitative forecasts of magnesium oxide markets are not available, industry spokesmen agree pretty well on which general areas can be expected to grow in the next few years.

The pulp and paper industry, for example, is considered an outstanding prospect for increased magnesium oxide consumption, because of a trend toward magnesium bisulfite pulping.

A promising new application, still in the development stage, is use of magnesia as a fuel-oil additive to prevent corrosion of alloys in gas turbine and boilers. Magnesia is considered by some to be the most effective and cheapest anticorrosive agent for this purpose.

Producers of refractory-grade magnesia expect a steadily increasing demand for their product in the production of periclase. There appears to be a distinct trend toward refractory brick of higher magnesium oxide content; open-hearth steel furnaces are becoming more numerous.

Hence, the future growth of the refractory magnesia business apparently will depend largely on the rate of U. S. steel expansion and the methods of steel production. But the growth-rate of steel output is itself a controversial point and hardly a fool-proof indicator of future refractory magnesia use.

This question is another reason accurate market forecasting in the magnesium oxide business is difficult. But alert producers are fast learning that even if no serious overcapacity problems develop, the most effective selling will be done by those with a broad and clear market picture of the industry as a whole.

U.S.I. CHEMICAL NEWS

October 26

★

A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries

★

1957

Second U.S.I. Polyethylene Plant Planned for 1958

A second plant to produce U.S.I. PETROTHENE® polyethylene will be built at a new location by National Petro-Chemicals Corporation, majority owned and managed by U.S.I. and minority owned by Panhandle Eastern Pipeline Company.

The new plant, scheduled for operation by late 1958, will produce 75 million pounds-per-year of intermediate density polyethylene resins. Capacity of the present Tuscola, Illinois plant is 100 million pounds-per-year, making the Company's total projected capacity 175 million pounds-per-year.

A modification of the conventional high-pressure process, already proved in the Tuscola plant, will be used in the new installation. Resins produced there will be of an intermediate density type, with properties somewhere between those of the original polyethylenes with which the public is familiar, and the new high-density resins produced by so-called "low-pressure" processes.

Gulf Coast Under Consideration

Site for the new plant has not been chosen. Several Gulf Coast sites are under consideration and the Company has already optioned land at more than one location. The new plant will be constructed in a location other than Tuscola in order to assure customers of a continuing source of supply if production at either location were to be temporarily interrupted. Dual locations will also provide two separate shipping points for PETROTHENE resins, and permit even more rapid delivery to customers in some areas.

Engineering of the new plant has not waited for a final decision on location, however, and this phase of the project is already well underway. M. W. Kellogg Company is handling design and construction of the new plant.

National Petro-Chemicals is already the third largest polyethylene producer in the United States, despite its relatively short history in this field. Petro first entered the field in February, 1955 when its 26 million pound-per-year plant in Tuscola, Illinois came onstream. This was expanded in 1956 to 50 million pounds-per-year, and again in 1957 to 100 million pounds-per-year.

New Feed Supplement for Ruminants Made by U.S.I.

A new, patented liquid feed supplement for cattle and sheep, trademarked MOREA®, will be made by U.S.I. and marketed in most states east of the Mississippi and west of the Continental Divide. U.S.I. will operate under license from Feed Service Corp. of Crete, Nebraska, which developed the product. Feed Service Corp. has been test marketing MOREA in the Midwest for the past several years.

The new supplement accelerates rumen fermentation, enabling cattle and sheep to eat and digest more feed in a shorter time. Dairy animals show improved production. Beef cattle grow faster, produce a higher quality meat than cattle raised by other



TVA Pilot Plant Demonstrates Fertilizer Formulation with Wet Process Phosphoric Acid

High Analysis Ammonium Phosphate and Ammonium Phosphate-Nitrate Mixtures Can be Granulated Easily And Economically with Continuous Ammoniator

Pilot plant runs, conducted recently by TVA's Office of Chemical Engineering at Wilson Dam, Alabama, demonstrated new methods for making high analysis ammonium phosphate and ammonium phosphate-nitrate granular fertilizers such as 7-28-28, 17-17-17 and 15-15-15. About 400 members of the industry saw the 3-day demonstrations, in which a key role was assigned to wet process phosphoric acid.

Most of the demonstrations were carried out in TVA's continuous ammoniator, in some cases with auxiliary equipment. This type of ammoniator is simple and has found extensive use in industry. It can be employed to make a wide range of grades from a variety of raw materials, including phosphate rock, the superphosphates, and many of the materials produced by U.S.I.—wet process phosphoric acid, anhydrous ammonia, nitrogen solutions, ammonium nitrate, and sulfuric and nitric acids.

Wet process phosphoric acid was used in preparing all ammonium phosphate and ammonium phosphate-nitrate mixtures shown in the table below, which summarizes data published by TVA.

Granulation of a number of grades was accomplished better with wet process acid than with electric furnace acid. Excellent granulation in high nitrogen products was achieved with wet process acid, to which a

small amount of iron ore form had been added. Granules of the products were generally spherical and quite hard. Bag-storage and open bin bulk-storage test results were favorable.

Wet Process Acid Economical

Also of prime interest at the demonstrations were studies prepared by TVA indicating that high analysis granular mixtures made with wet process phosphoric acid may be produced at lower cost than conventional fertilizers. This was shown specifically for several grades, using raw materials costs believed typical for a midwestern location.

Other highlights of the demonstrations included manufacture of high analysis mixed goods using diammonium phosphate, superphosphoric acid, and electric furnace phosphoric acid; manufacture of nitric acid phosphates, granular normal superphosphate, granular triple superphosphate, granular enriched superphosphate, and granular non-nitrogen grades.

TVA FORMULATIONS FOR AMMONIUM PHOSPHATE, AND AMMONIUM PHOSPHATE-NITRATE FERTILIZERS UTILIZING WET PROCESS PHOSPHORIC ACID

Material	Grade	17-17-17	15-15-15	11-22-22	16-48-0	8-16-32	7-28-28
Phosphoric Acid, Wet Process	75% H ₃ PO ₄	625	425	809	1767	589	1031
Ammoniating Solution *	—	826 (Z-7)	481 (Z-7)	541 (X)	242 (X)	362 (X-6)	—
Anhydrous Ammonia	—	—	—	—	275	—	173
Ammonium Sulfate	20.5% N	—	500	—	—	—	—
Sulfuric Acid	93% H ₂ SO ₄	112	—	—	—	—	—
Potassium Chloride	60% K ₂ O	567	500	733	—	1067	933
Concentrated Superphosphate	46% P ₂ O ₅	—	150	—	—	—	—
Iron Ore	—	—	—	—	—	20	—
Filler	—	—	—	51	—	—	—
Conditioner	—	44	53	80	88	84	52
Recycle	—	4500	2000	2500	7000	1500	2000

* COMPOSITION OF AMMONIATING SOLUTIONS, %

(U.S.I. Designation)	TVA Designation	Free Ammonia	Ammonium Nitrate	Ammonium Carbamate	Water	Total N
(1)	X	22.2	65.0	0	12.8	41.0
(10)	X-6	25.0	69.0	0	6.0	44.8
(2)	Y	26.2	55.5	0	18.3	41.0
(12)	Z-7	19.0	74.0	0	7.0	41.4

October 26

★

U.S.I. CHEMICAL NEWS

★

1957

CONTINUED Supplement

feeding methods (more marbling with less waste fat).

MOREA is a liquid mixture containing urea, ethanol, phosphoric acid, essential trace minerals and molasses. U.S.I. will sell a concentrated liquid MOREA premix to feed manufacturers who will blend the concentrate with molasses. The company is currently appointing manufacturers who will mix and distribute the final MOREA product to feeders. U.S.I. is a basic producer of ethanol and phosphoric acid which are both in the premix.

X-rays Measure Hafnium In Zirconium Samples

Small amounts of hafnium in zirconium samples can be determined by means of X-ray fluorescence, according to two members of the Faculty of Science of Paris. After a sample is bombarded with X-rays, an aluminum monocrystal and a Geiger counter measure the intensity of the resulting characteristic spectrum of hafnium.

More precise measurements may be obtained by monitoring part of the beam from the X-ray tube with a tantalum sample and an auxiliary counter. A hafnium content of about 0.016% can be detected in this way.

Come to the "Atomfair"

The 1957 Trade Fair of the Atomic Industry is being held at the New York Coliseum from October 28-31. The Fair is being staged in conjunction with the Atomic Industrial Forum's annual atomic industry conference; the Winter meeting of the American Nuclear Society; the first major unclassified Reactor Safety Conference; the second conference on Careers in Nuclear Science & Engineering; and the annual meeting of the Professional Group on Nuclear Science of the Institute of Radio Engineers.

Look for U.S.I. in Booths 117-118.

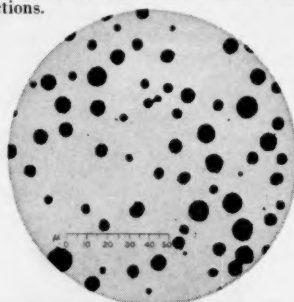
Sodium Dispersions May Be Key to Lower Cost Acetylacetone Production

The use of sodium dispersions as a catalyst for production of acetylacetone may permit substantial reductions in production costs, according to recently reported experimental work. Yields are higher, and reaction time much shorter, than with processes using sodium alkoxide or small pieces of metallic sodium. Also, the hazards involved in producing acetylacetone by the sodium alkoxide route are minimized when sodium dispersions are used.

In the experiments reported, sodium dispersions in toluene and xylene were added to mixtures of acetone and methyl acetate with the medium-boiling hydrocarbons as diluents. The dispersion samples used were obtained from U.S.I. The reaction was carefully controlled. Acetic acid and ethyl acetate were used to separate and extract the acetylacetone. On distillation under vacuum, a water-white, acid-free acetylacetone of 97 to 99% purity was obtained.

Total reaction time was about two hours, as compared with 24 hours with small pieces of sodium and 40 to 50 hours with sodium alkoxide.

A recently published 42 page booklet entitled "Sodium Dispersions" is available from U.S.I. to those interested in using sodium in dispersed form for this or similar reactions.



Photomicrograph of typical sodium dispersion, with most particles of 2-15 microns diameter.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U. S. I.

A new polyvinyl acetate resin emulsion adhesive, compatible with dextine adhesives, is designed for high-speed case and carton sealing. Adhesives can be changed without shutting down machine to clean glue box. **No. 1281**

Proteins and amino acids in animal nutrition are discussed in detail in a revised, up-to-date booklet. Included are such subjects as Mutual Supplementary Action of Proteins; Relation of Amino Acid Requirements to Protein Level. **No. 1282**

Electronically heat-sealable vinyl gravure inks in a wide range of colors are currently being produced. Prints for automotive upholstery have been heat-sealed without destructive arcing sometimes found in conventional inks. **No. 1283**

An atomic reactor is being made with a polyethylene moderator. Can be used for applied research, radiation testing, a wide range of educational purposes—such as training of reactor operators. Said to be versatile, inexpensive. **No. 1284**

A differential pressure liquid level transmitter mounted directly on a tank nozzle measures viscous or slurry-type liquids in open or closed vessels. It uses a force balance principle, can operate a remote indicator or recorder. **No. 1285**

A bright new B-O-N type red pigment has a bluish shade, good light and bleed resistance. Can be used alone or with other colors for a variety of shades. Said to be lower in cost, easier to grind. **No. 1286**

Polyethylene ware for laboratories and clinics is described in a new 8-page bulletin. Items available include beakers, aspirator bottles, tubing, pipet-fillers, vials, carboys. **No. 1287**

A new synthetic gum is said to be an excellent binder that dissolves in water or alcohol to give non-viscous solutions, even in high concentrations. Requires no preservative, being self-active as bactericide or germicide. **No. 1288**

A new hydrophobic lanolin derivative with good solubility and solubilizing properties is said to be valuable for aerosols, shampoos, suntan and sunscreen preparations, and powders and talcs. **No. 1289**

Fire extinguishers are described in a new buyers guide. Information is given on dimensions, discharge ranges, laboratory approvals and classifications, and other construction data for portable fire-protection equipment. **No. 1290**

PRODUCTS OF U.S.I.

INORGANIC CHEMICALS:

Sodium, Metallic: cast solid in tank cars, steel drums, pails; bricks in barrels, pails.

Chlorine: liquid, in tank cars.

Caustic Soda: 50% liquid, in tank cars.

Sodium Peroxide: dust-free granules, in drums.

Sodium Sulfate

Sulfuric Acid: all strengths, 60° Baumé to 40% Oleum. Also Electrolytic grade to Federal specifications. Tank cars or tank wagons.

Phosphoric Fertilizer Solution (Wet Process Phosphoric Acid)

Ammonia: Anhydrous, commercial and refrigeration. Tank cars or tank wagons.

Nitrogen Fertilizer Solutions

Ammonium Nitrate: 83%

OTHER PRODUCTS:

Alcohols: Ethyl (pure and all denatured formulas), Normal Butyl, Amyl, Fusel Oil; Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL® PR.

PETROTHENE® Polyethylene Resins.

Esters, Ethers and Ketones: Normal Butyl Acetate, Dibutyl Phthalate, Diethyl Carbonate, Diethyl Oxalate, Ethyl Acetate, Ethyl Ether, Acetone, Diethyl Ether.

Intermediates and Fine Chemicals: Acetoacetylides, Dimethyl Hydrazine, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Chloride, Ethyl Sodium Oxalacetate, U.S.I. ISOSEBACIC® Acid, Methyl Hydrazine, Sodium Ethylate Solution, Triethyl Aluminum, Trimethyl Aluminum, Urethan USP (Ethyl Carbamate).

Animal Feed Products: Calcium Pantothenate, Choline Chloride Products, Curbay B-G® 80, Special Liquid Curbay®, DL-Methionine, Niacin USP, Riboflavin Concentrates, Vitamin B₁₂ and Antibiotic Feed Supplements, Vacatone® 40, Vitamin D₂ and K₃ Products, Antioxidant (BHT) Products, Special Mixes, U.S.I. Permadry Products (Sealed-In Vitamin A).

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Riboflavin USP, Urethan USP, Intermediates.

Metals: Titanium Sponge, Zirconium Sponge, Zirconium Platelets, Hafnium Oxide, Hafnium Sponge.

U.S.I. SALES OFFICES

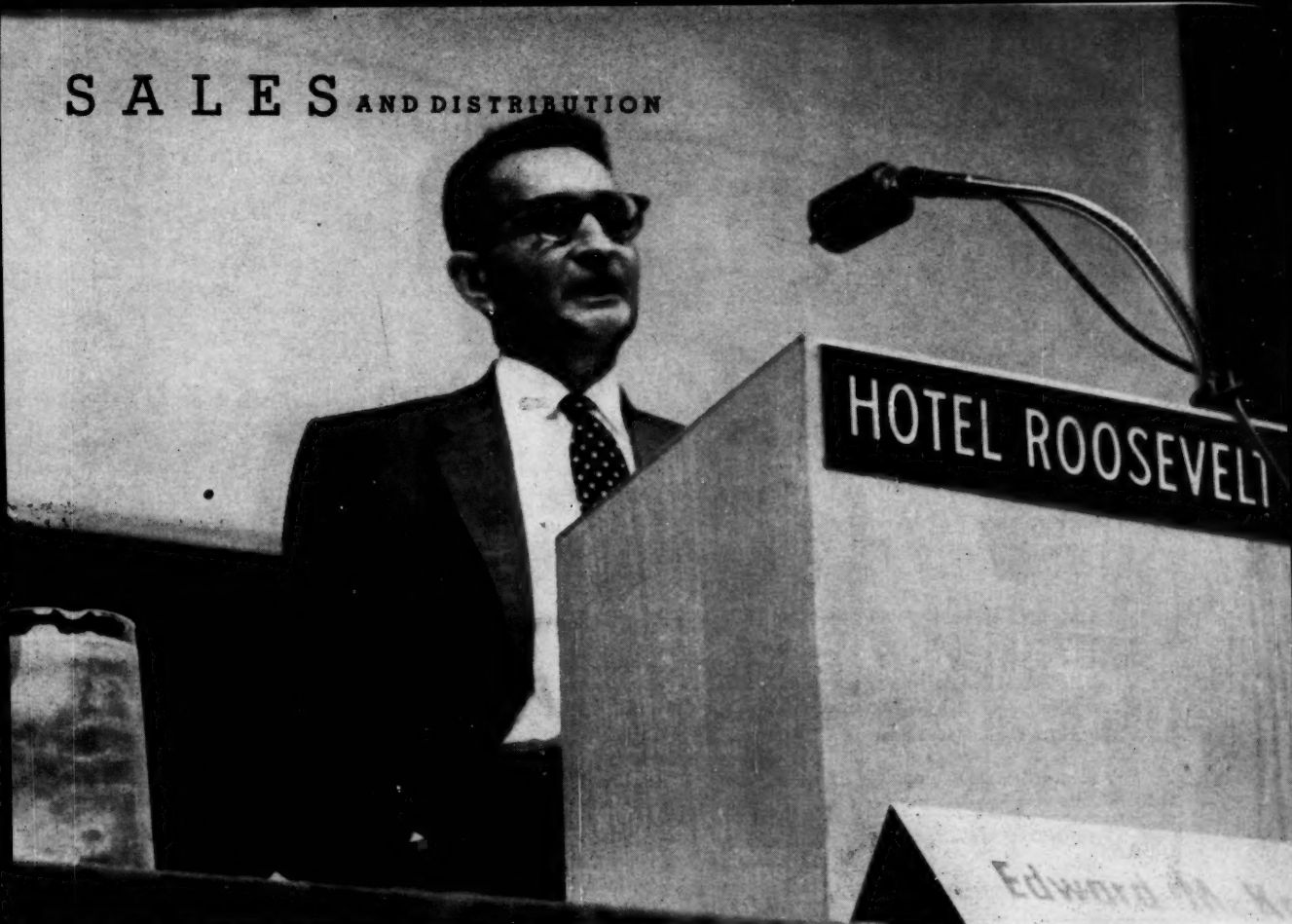
Atlanta • Baltimore • Boston • Buffalo • Chicago • Cincinnati
Cleveland • Dallas • Detroit • Houston • Indianapolis • Kansas City, Mo.
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INDUSTRIAL CHEMICALS CO.

Division of National Distillers and Chemical Corporation

99 Park Avenue, New York 16, N. Y.



FRANK AMELIA

Veteran purchasing agent and management educator Krech tells SAACI why chemical buyers are . . .

Speaking Out for 'Sincere' Salesmanship

The occasion couldn't have been more opportune. Confronted by more than 400 chemical salesmen and sales executives, Edward Krech, J. M. Huber's director of purchases, stepped to the podium a few days ago, let go with some candid and revealing slants on "sales sincerity"—all for the benefit of the sixth Annual Sales Clinic of the Salesmen's Assn. of the American Chemical Industry (SAACI).

Drawing upon his 15 years of experience as a purchasing agent, Krech* pleaded convincingly for a "more sincere interest in the buyer's problems," prepared sales calls, better-informed salesmen and more attention to the "followup." Although, Krech estimates, perhaps only 20-25% of all chemical buyers demand exacting sales servicing, such buyers account

for 75% of chemical purchases. That's why chemical salesmen should make a real try to offer top-notch service.

Right Start: Despite today's vastly improved sales training and marketing know-how, Krech finds that "far too frequently" salesmen "call 'cold' the first time." That's especially surprising because the "first contact with the purchasing agent is one of the most important the salesman ever makes." There's nothing, adds Krech, that provokes a buyer more than having to tell a salesman what the company makes, what it buys and where its plants are located.

The salesman who looks up such facts in advance demonstrates on his first call that he has an interest in the company. Purchasing agents often respond by talking about plant problems, giving the caller useful and supplemental information.

Advance appointments are another way of smoothing the initial interview.

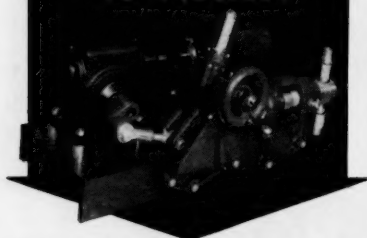
The method allows the buyer time to prepare for intelligent discussions with the salesmen, think of where the vendor's products might fit in.

Krech also suggests that salesmen take a look at their personal appearance. Neatness, courtesy and cheerfulness, despite stress in sales manuals, "are neglected far too often. It's a privilege to talk to guys who are 'alive'."

Interview Pointers: The outstanding characteristic that appeals to buyers asserts Krech, is a salesman's sincere interest in helping. "If a sales representative gives the impression that all he's after is an order, he won't get to first base. Buyers are grateful to the caller who is interested in purchasing agents' problems and most of them have plenty. The 'sincere' salesman is always trying to reduce a buyer's cost, solve a problem, or improve the customer's product. Show sincere interest early, and you'll make out. Purchasing

*Other qualifications: 10 years of sales experience; past president of the New York Purchasing Agents' Assn.; Lecturer at American Management Assn. seminars and the National Sales Executives Graduate School of Sales Management.

NEED ACCURATE CHEMICAL FEEDING TO PROCESS?



Check into this small, efficient, proportioning pump by **PROPORTIONEERS!**

For greater accuracy, greater range, feed all chemicals (alkaline, neutral, or acid) with this Model 1106 Proportioneer. Pay less, get more . . . interchangeable measuring cylinders, super-accurate Vane-Guide check valves, percentage calibrated stroke-length scale, adjustable in-motion.

- Accuracy — within $\pm 1\%$
- Adjustment range — 15 to 1
- Capacities — from 0.11 to 35.6 GPH
- For discharge pressures up to 1100 psig.

Request Bulletin 1106-2 for complete data.

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Announcing The PACIFIC NORTHWEST'S own source of BRIGHT SULPHUR

On-stream October 1, 1957—Jefferson Lake's new sulphur plant at Fort St. John, B.C. Inventories at Fort St. John and Vancouver, B.C., for fast delivery.

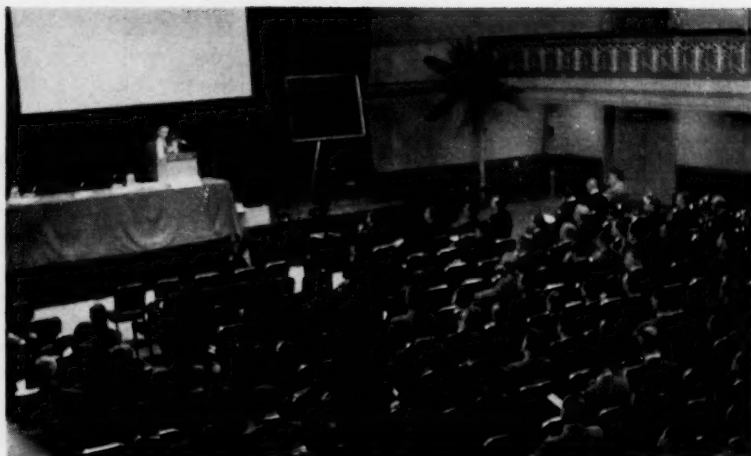
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SALES



FRANK AMELIA

'Salesmen need to improve approach, interviews and followup.'

agents look for 'sincere interest' every day."

Thorough knowledge of his products and his company also helps a salesman score a hit with the buyer. The buyer knows a little about a lot of products; the salesman should have a vast amount of knowledge about a few items, and perhaps as much as 75% of the buyer's know-how is obtained from sales staffers, says Krech. "There's no limit to a good salesman's stock of information about his products, his company, the manufacturing, shipping and technical facilities and key personnel."

Particularly important: knowledge of what makes the salesman's product different from that offered by competitors. "Generally, somewhere, there's a difference—no matter how standardized a product may be—and that difference may be the difference between a good plant operation and a poor one. Moreover, it gives the salesman something to talk about."

Lack of traffic knowledge is a particularly weak spot of chemical salesmen. On many materials today, Krech contends, the cost of transportation is equal to that of the product. The sales representative who has a money-saving or service-improving idea on shipping has a distinct edge over his rival.

The sales caller who brings useful trade gossip also rates a high mark in Krech's book. Buyers, he declares, don't want confidential material bandied about loosely, but there's plenty of non-confidential material of

value. Appreciated most: tips on commodity market movements, supply and demand data, news of new plants, acquisitions and mergers. "This type of patter is important and preferred to the usual tripe about weather, health and baseball."

Fruits of the Followup: Too many salesmen think their job is done when they have the order. Not so, Krech contends. It's important that the salesman check the progress of the order and delivery, help prevent the customer from being embarrassed by slip-ups, slow or late deliveries. Equally essential are fast followups of requests for information. Interestingly, Krech is inclined to blame sales management and other management levels for tardiness in answering queries. "The fellow who gets there first with the most is the one who is remembered and often gets the order."

Another aspect of the followup—repeat calls—also drew criticism.

The "I-was-in-the-neighborhood, thought-I'd-drop-by" line usually infuriates the busy purchasing agent. Krech's advice: "Don't drop in if you have nothing to talk about."

Topping off his pointers for chemical salesmen, Krech emphasized four "don'ts" of special significance to salesman:

- Don't take anything for granted. Products, competition, plant locations, shipping and packaging are constantly changing. Failure to keep abreast of new developments can make a customer an ex-customer.

- Don't expect reciprocity to sell

coatings that s-t-r-e-t-c-h

VERSAMID

Flexographic inks that can't crack or peel are made possible with Versamid resins. Used for printing on

cellophane, glassine, polyethylene, other plastics, they have high tensile strength, quick-grip adhesion.

Formulate controlled flexibility with versatile **Versamid*** polyamide resins

Flexible properties of resins are essential in—

- coatings
- adhesives
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Versamid's unusual molecular structure provides a high degree of flexibility in combination with other desirable properties. They offer quick, hard-grip adhesion; excellent resistance to water, grease, oils, alkalis; and a wide range of softening points and solubilities.

Flexible Versamids resist mechanical and thermal shock, abrasion, shearing. They are compatible with many resins and plasticizers. And Versamids are non-toxic—safe to work with throughout all stages of production.

*Trademark of General Mills Polyamide Resins.

choose the Versamid polyamide resin that best suits your particular needs:

DESCRIPTION	USE	PACKAGING
Thermosetting types (100 series) fluid	Protective Coatings, Potting and Casting, Laminates, Adhesives	Drums (S.T.C.) 14 and 55 gallons 100 lbs. and 400 lb. net
Thermoplastic types (900 series) solid	Paper Coatings, Heat Seal Adhesives, Thixotropic Paint, Printing Inks	Drums fiber, 200 lbs. net 50 lb. Multi-Wall Paper Bags
Organic solvent solutions (400 series)	Protective Coatings, Decorative Coatings	Drums, 55 gallons (S.T.C.) net 400 lbs.

General Mills does not make flexographic inks, only the versatile Versamid resins that make them possible.

CHEMICAL DIVISION

Kankakee, Illinois



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SALES

for you. Reciprocity can be a great aid in cementing a relationship that's basically sound, but salesmen can't depend on it for selling. Purchasing agents must buy competitively to contribute to their company's welfare—and to keep their own jobs.

- Don't use gratuities or excessive entertainment. The business luncheon is desirable, but expensive gifts have little place in good buyer-seller relationships. You can't "buy" business that way.

- Don't neglect an established customer when pressured to boost sales by obtaining new business, for it takes less effort to hold an old customer than to obtain a new one.

Chemical salesmen will, of course, take issue with some of Krech's points. Some, for example, feel that it's possible to overdo the followup, make oneself a nuisance both to the customer and to the sales office staff. But a *CW* spot-check found that salesmen think there's much to be said in favor of the planned sales call and thorough knowledge of products and the customer.

DATA DIGEST

- **Hydrogen peroxide:** New booklet describes methods and equipment for diluting commercial grades of hydrogen peroxide. Dilution formulas, container data and analytical procedures are included. Solvay Process Division, Allied Chemical & Dye Corp. (New York).

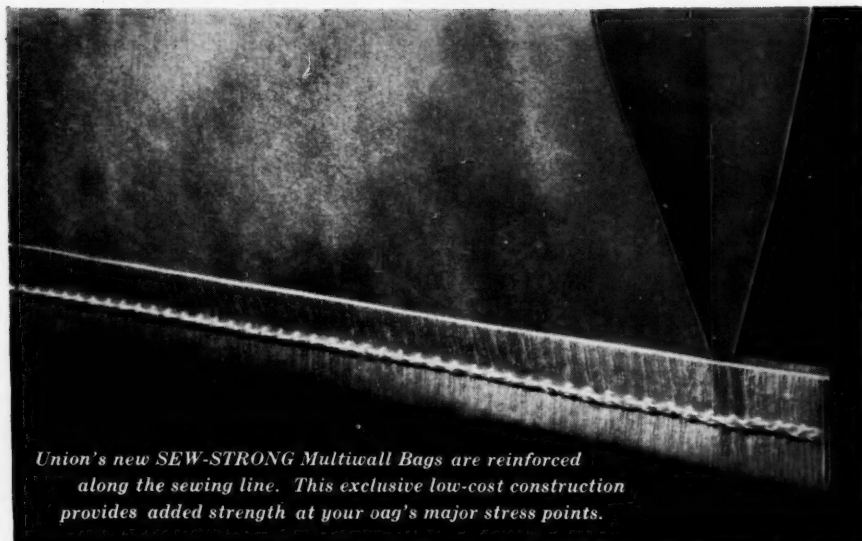
- **Fatty acids:** Folder lists specifications and compositions of more than 180 fatty acids, derivatives and industrial oils. Applications in corrosion inhibitors, flotation reagents, intermediate manufacture, fuel additives and other areas are tabulated. Armour & Co., Chemical Division (Chicago).

- **Potato starches:** 12-page booklet presents physical and chemical properties of amylose and amylopectin, discusses preparation and stabilization of solutions, and lists potential applications. Stein Hall (New York).

- **Vinyl plastisols:** Curves and charts relating plastisol viscosity to types and concentrations of fillers, plasticizers, pigments, stabilizers, surfactants and diluents are included in new, 28-page brochure. Plastisol uses in coatings, slush molding, dip coating, casting and plastigels, and facts on compounding procedures are dis-

At lower cost . . .

Added protection at the sewing line with Union **SEW-STRONG** multiwalls



Union's new SEW-STRONG Multiwall Bags are reinforced along the sewing line. This exclusive low-cost construction provides added strength at your bag's major stress points.

SEW-STRONG lowers your costs by eliminating plies with no sacrifice in strength. SEW-STRONG's construction is so simple and inexpensive that even a reduction of 10 lbs. in paper weight can save you money. Actual savings will depend largely on your product. A "takeout" of 20 to 30 lbs., resulting in \$5.00 to \$7.00 per thousand in your bag costs, is not unusual.

Tests prove SEW-STRONG's economy

Union has drop-tested many types of Multiwalls. The results have been measured in *safe-inches-of-drop-per-dollar-spent*. Ask your Union Multiwall salesman to show you these comparative figures along with actual field tests. Both clearly demonstrate the extra value you receive in Union's new SEW-STRONG multiwalls.



UNION MULTIWALLS

UNION BAG-CAMP PAPER Corporation

233 Broadway, New York 7, N. Y.



**Union Bag-Camp Paper Corp.
Multiwall Division
233 Broadway, New York 7, N.Y.**

Please have your representative call to demonstrate and explain Union's new SEW-STRONG Multiwall Bag.

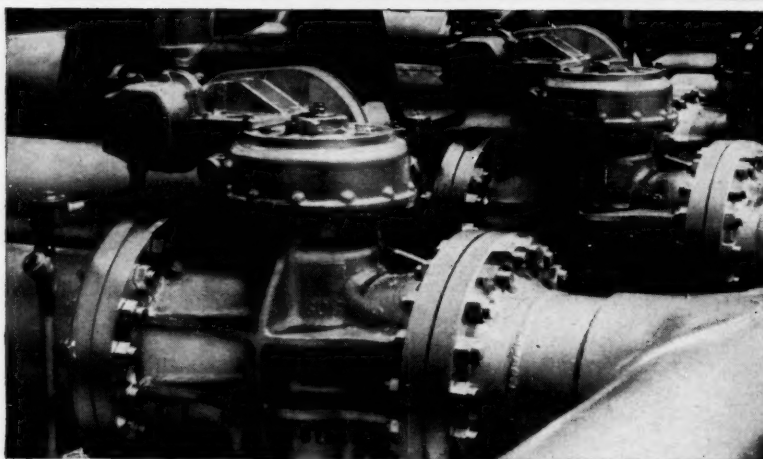
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LUBRICATED valve cuts automation costs

Ordinary valves need costly, heavy power mechanisms to close and wedge-in the sealing seats. The Rockwell-Nordstrom lubricated plug valve has proven easier and less costly to automate than other valves because it closes with a lubricant-smooth quarter-turn. The result: simpler, less costly power actuators and fast, precise flow control. And

the plastic lubricant sealing film that prevents leakage also reduces wearing friction for longer life at lower cost. Rockwell-Nordstrom valves are available in a full range of sizes for hydraulic and pneumatic cylinder, electric and pneumatic motor operation. Write for more details.

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PITTSBURGH 8, PA.

ORGANIC PEROXIDES

DI-t-BUTYL PEROXIDE

**STABLE, LIQUID POLYMERIZATION
CATALYST FOR USE AT
TEMPERATURES ABOVE 100°C**

ASSAY-97% (MIN.)

**WAREHOUSE STOCKS CONVENIENTLY LOCATED
THROUGHOUT THE COUNTRY**



**LUCIDOL DIVISION
WALLACE & TIERNAN INCORPORATED
BUFFALO 5, NEW YORK**

SALES

cussed. Plastics Division, Monsanto Chemical Co. (Springfield, Mass.).

- **Catalog:** Properties and typical uses for more than 100 inorganic and organic chemicals are tabulated in new manual. Rubber processing and 21 new, developmental chemicals are included. Pennsalt Chemicals Corp.

- **Specialty chemicals:** Folder describes properties of thermoplastic resins and line of heavy oils. Suggested uses for the resins: in rubber plasticizers, lamination adhesives, coating component insulation and component sealers. Applications for the oils are proposed in greases, gear lubes, vinyl, rubber and cumarone-indene resin plasticizers. Kendall Refining Co.

- **Polyvinylpyrrolidone:** Brochure (48 pages) gives molecular weight, viscosity, solubility, film-forming, compatibility, stability, colloid activity, complex-formation and toxicity data. Uses are described in cosmetics, drugs, adhesives, detergents, textiles, paper processing, inks, coatings, agricultural chemicals, plastics and other fields. Antara Chemicals, division of General Aniline and Film Corp. (New York).

- **Foilwall bags:** Folder outlines advantages of aluminum foil multi-wall bags, describes several types that can be supplied. Reynolds Metals Co.

- **Neopentyl glycol:** Applications in polymeric plasticizers, polyurethane foams, unsaturated polyester resins, monoesters and alkyd resin modification are treated in 4-page booklet. Eastman Chemical Products, Inc.

- **Corrugated containers:** Folder describes use of square and octagonal containers in shipping plastics and chemicals. Gaylord Container Corp. (St. Louis).

- **Plasticizer:** Bulletin outlines properties of Plastolein 9078 LT Plasticizer, a low-temperature material claimed to be suitable for vinyl sheeting, coated fabrics, extruded items and industrial tapes. Emery Industries, Inc. (Cincinnati).

- **Fatty acids:** "Slide guide" is a device for the tabulation of physical properties of 16 fatty acid products. Wilson Martin, division of Wilson & Co. (Philadelphia).

- **Guar gum:** Three booklets cover the use of Gaurtec guar gum. One briefly describes applications in all industries; the others give detailed information on uses in the paper industry and the mining industry. General Mills (Minneapolis).

PAPER and PAINT improve when 4 millionths of an inch is **BIG**

This is a photomicrograph of one of Koppers new FORTIFIED styrene-butadiene latices. Even the largest particles in these improved DYLEX® latices measure no more than 4 millionths of an inch; most of the particles are far smaller. This small particle size promises major improvements . . .

in paint, FORTIFIED DYLEX K-34 provides improved pigment binding strength, improved adhesion, and scrubability. It can be used in combination with long oil alkyds, with proteinacious or cellulosic water-soluble resins and other styrene-butadiene latices.

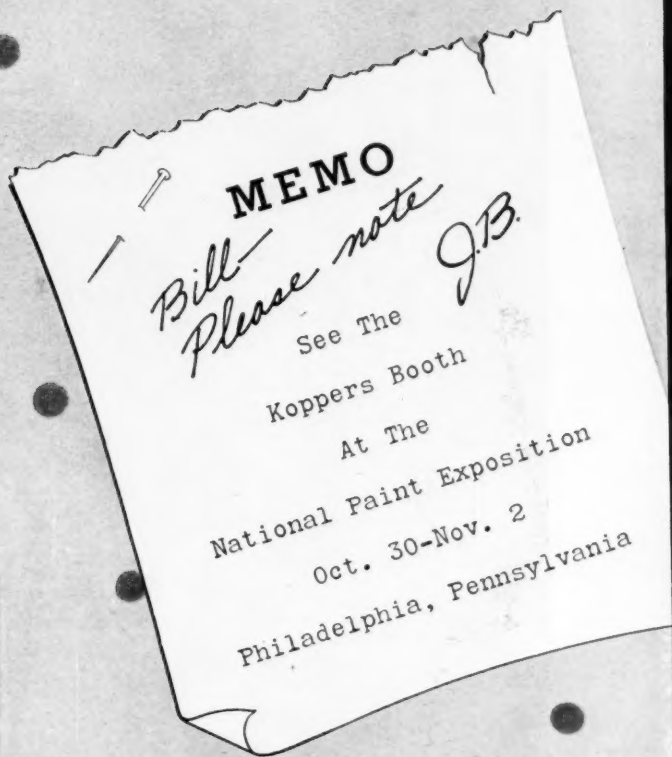
in coated paper, FORTIFIED DYLEX K-52 improves the flow of casein, or starch base coatings, during application. It gives the starch better water resistance and retards picking. It increases the smoothness, gloss, and wet-rub resistance of coated papers, and improves their printability.

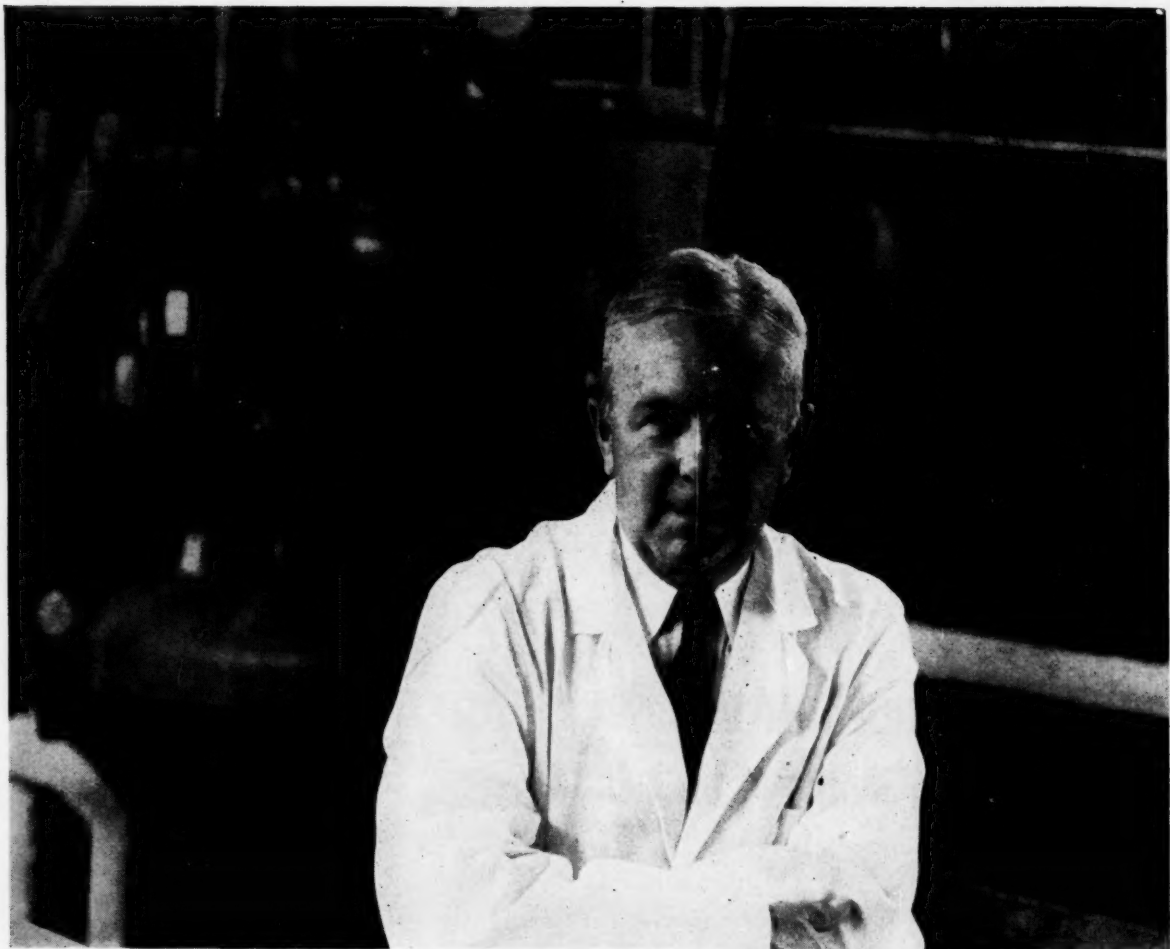
Write for technical literature describing these latices and the new catalog of synthetic chemicals manufactured by Koppers. There is no obligation, of course. Koppers Company, Inc., Chemical Division, Dept. CW-107, Pittsburgh 19, Pennsylvania.

Offices in Principal Cities
In Canada: Dominion Anilines
and Chemicals Ltd., Toronto, Ontario



KOPPERS CHEMICALS





This man runs the only glycol dimethyl ether plant in U.S.

Clayton Parcels is in charge of Ansul's glycol dimethyl ether plant, the only one in the United States. His plant is running at full capacity because these unique solvents are playing a vital role in many new chemical processes.

Take the exciting things being done with metal hydrides, for instance. Sodium borohydride required a non-reactive solvent, so Ansul Ether 141 (dimethyl ether of diethylene glycol) was suggested. Now sodium borohydride can be used effectively as a reducing

agent for aldehydes, ketones, acid chlorides, acid anhydrides—and most recently—in ester reductions.

Mr. Parcels would like to send you our new 27-page technical bulletin on the solubility and stability of commercially available hydrides in Ansul glycol dimethyl ethers. For that matter, he'd be happy to talk with you about any chemical problems that might require a specialized solvent. Write Clayton Parcels, **ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN.**



INDUSTRIAL CHEMICALS • FIRE FIGHTING EQUIPMENT • REFRIGERATION PRODUCTS

Market Newsletter

CHEMICAL WEEK
October 26, 1957

Price cuts on lead and copper highlight the news from the non-ferrous metals market. U.S. lead tags are down to 13½¢/lb. (lowest in 3½ years), following last week's ½¢/lb. decline; prices on domestic custom smelters' copper have been shaved a like amount, are pegged at 25½¢/lb.

These developments, of course, come as no surprise. Take the copper break, for instance. When domestic smelters' prices turned upward (to 26¢/lb.) some weeks ago, not all trade followers were convinced that the action heralded the end of the pricing decline the metal has been in over the past year or so. Too many pressuring factors—including rough competition from lower-cost foreign material—were still present; thus there's still no real market stability for the metal or for the broad range of copper chemicals (*CW*, Oct. 12, p. 137).

What will primary copper producers do now? Chances are that despite the lower price on smelters' material, primary producers will not budge from their present 27¢/lb. schedule. Although the latter price has been rather shakily maintained since early September, producers hope to convince consumers that copper prices can—and, if at all possible, will—remain steady.

Reason behind the latest lead price chop has little connection with the current unsettled domestic demand situation. The decline comes in the wake of lower London Metals Exchange quotations and reports that London is selling 20,000 tons of stockpiled lead. That quantity is all that remains in Britain's strategic hoard.

Some sources tab the U. S. reduction as an attempt to block low-cost imports that may result and also as a move that could bolster arguments, in Tariff Commission hearings next month, that domestic lead producers are in tough straits.

As might have been expected, lead oxide prices are lower following the reductions of metal prices. New schedules posted by major producers knock ½¢/lb. off basic paint materials—dry red lead, litharge and orange mineral.

Dry red lead (95%) is down to a c.l. level of 15.75¢/lb.—97% is 15.95¢ and 98% is 16.10¢/lb.; lower price of litharge is 15.25¢/lb.; and orange mineral (c.l.) is 18.10¢. L.c.l. prices are 1¢/lb. higher than these quotes.

Coke-oven chemical producers are showing some concern as inventories continue to climb. That's particularly true of benzol. It's a complete switch in market status since early this year (*CW Market Newsletter*, Feb. 9), when coke-oven operations were plugging along at near-

Market Newsletter

(Continued)

capacity rates to satisfy clamoring customers. Imports are much lower than they were, which adds further evidence that greater amounts of domestic material are now available.

Oversupply of coal-derived benzol, of course, is expected to have some effect on petrobenzene sales. At the moment, though, movement to consuming industries is reported as fairly good.

It's moot whether producers (of both types) will definitely deem it necessary to retreat slightly from the present—and long-time-held—price of 36¢/gal. (tanks), but some feel that a cut is more than likely, to ease the growing stock problem. Answer may come with first-quarter '58 postings.

The current toluene price may also be vulnerable. The present 29½¢/gal. tag (at most shipping points) on domestic coke-oven material isn't too firm, say market observers, and could slip if competitive pressures from petroleum-derived toluene and blended solvents continue to build up.

Nub of the coke-oven operator's toluol woes is similar to that concerning benzol: sales haven't been too bad, but volume of movement hasn't been great enough to keep in check the surplus that's been developing over the past several months.

U. S. ammonia capacity took another step last week in its stride toward a whopping near 5-million-tons/year capacity (*CW*, Jan. 12, p. 64). Large-scale production was started at Calumet Nitrogen Products' new plant at Hammond, Ind.

The ammonia installation—with a 300-tons/day capacity, of which 100 tons will be converted into nitrogen solutions—operates in conjunction with a nitric acid plant and an ammonium nitrate solutions plant north of the Calumet ship canal in Hammond.

Needed hydrogen for the units is piped in from high-octane gasoline manufacturing sources at Whiting and East Chicago, Ind., refineries. The tie-in works both ways: products of the new plant are available from the joint owners of Calumet Nitrogen—Standard Oil of Indiana, and Sinclair Chemicals, a subsidiary of Sinclair Refining.

SELECTED PRICE CHANGES — WEEK ENDING OCTOBER 21, 1957

	Change	New Price
DOWN		
Copper cyanide, tech., dms., 20,000-lb. lots or more, lb.	\$0.016	\$0.666
Lead, metal, prime pigs, N.Y., lb.	0.005	0.135
Dry red lead (95%), c.l., wks., frt. alld., lb.	0.005	0.1575
Litharge, comml. pdr., bbls., c.l., wks., frt. eqld., lb.	0.005	0.1525
Orange mineral, bbls., l.c.l., wks., lb.	0.005	0.1910

**ANHYDROUS AMMONIA
NITROGEN SOLUTIONS**
from **STANDARD OIL**

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STANDARD OIL COMPANY
Indiana

Spectrum of E

CW Report

A black and white photograph of a woman with short dark hair, sitting cross-legged on the floor. She is wearing a white long-sleeved button-down shirt tucked into high-waisted, light-colored trousers. She holds a dark, vintage-style telephone receiver to her right ear with her right hand. Her left hand rests on her lap, showing a ring on her ring finger. She has a slight smile and is looking directly at the camera. The background is a plain, light-colored wall. To the left, a portion of a perforated metal panel is visible. In the bottom left corner, the word "Port" is partially visible in a bold, sans-serif font.

Shapes Plastics Outlook



In New York's Belmont-Plaza Hotel this week, a symposium held by the Association of Consulting Chemists and Chemical Engineers brought together a panel of experts to dissect trends in the synthetic organics industry.

Scheduled to be on the dais with keynoter Herman Mark, Polytechnic Institute of Brooklyn's polymer giant, were four consultants, Erwin DiCyan (pharmaceuticals), Eugene Schwarz (dyes and synthetic fibers), Carl Mattmann (fabrics) and Irving Skeist (plastics).

Skeist, known to CW readers for earlier reports on plastics (CW, Nov. 19, '55) and plasticizers (CW, April 16, '55), has expanded his presentation into this CW Report.

ONE BILLION POUNDS in '46, two billion in '50, three billion in '54, four billion in '56 and close to 4.5 billion pounds this year is the striking record of synthetic resin production in the last ten years.

One of the most competitive and changeable of all areas of chemical manufacture, plastics now account for \$1 billion worth of sales at the manufacturers' level, \$2 billion worth at the consumers' level. And more's to come: output should hit 5.7 billion lbs./year by '60 if present trends continue.

In the 1946-'56 decade, plastics and resins showed a 230% increase. This compares with the smaller gains made by: aluminum, 90%; synthetic rubber, 110%; portland cement, 65%; paperboard, 50%; steel, 35%; rayon and acetate fibers, 20%; lumber, 6%.

For many of the precocious newer plastics, the future looks bright indeed. But other plastics seem to be settling down to a production pace dictated by population growth. To do no better than things in general is an unaccustomed plight for plastics sales managers.

Consider what's happening to the older plastics.

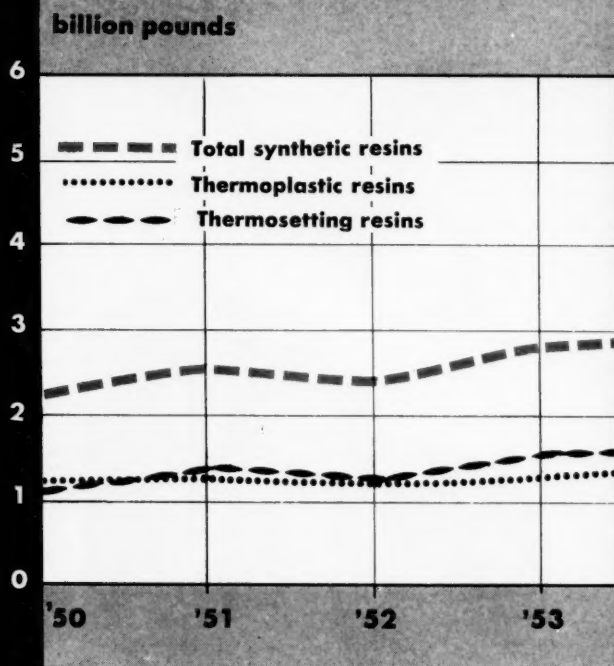
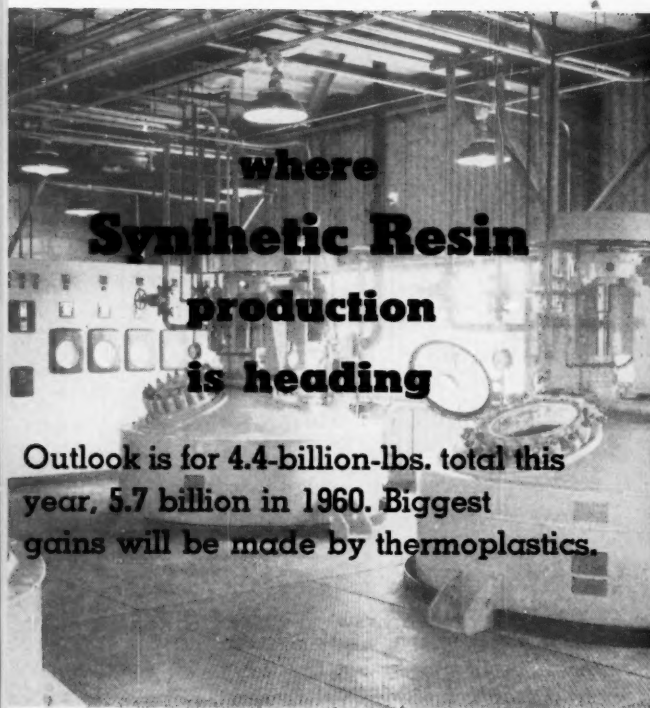
CELLULOSICS

Cellulosics have lost ground to slush-molded vinyls in much of the doll-body business—one of their biggest outlets. Women's shoe heels provided a welcome outlet that has partly offset this loss.

"Blister" packaging could help cellulosic sheet sales. Celanese Corp. plans a strong sales push for 0.88-mil cellulose acetate—the "breathable film"—in repackaging of vegetables and meats.

The photo-film business continues to grow at a lively

Spectrum of End-Products Shapes Plastics Outlook (cont'd)



step; and modern decor suggests a colored cellulose butyrate or propionate phone—all good news to cellulose producers.

PHENOLICS

The noise of jet planes is music to the ears of phenolics producers. Among the moderate-priced plastics, phenolics are most resistant to heat—and heat is the handmaiden of high-speed aviation.

For structural purposes, phenolics are reinforced with glass or asbestos; for bonding aluminum and other metals, they are alloyed with epoxies. Shell molding and the bonding of wood waste are still promising outlets for phenolics but, so far, have been slow in developing as markets.

UREA and MELAMINE

Amino resins have made progress as bonding and adhesive resins—urea for plywood, melamine for decorative facings of phenolic laminates. Melamine producers continue to benefit from imaginative styling and quality molding of dishware.

Plaskon (part of Allied's Barrett Division)—second only to American Cyanamid in amino-resin molding-powder production—has recently increased its pro-

duction capacity; it expects to sell more urea-formaldehyde for large moldings (e. g., TV cabinets) that are now readily accomplished by electronic preheating.

ACRYLICS

Acrylics have been regarded as "luxury" polymers because of their generally higher unit cost. The monomers and methacrylate molding powders are currently available from Rohm & Haas and Du Pont, but another producer, Hawthorne Chemical, is moving in.

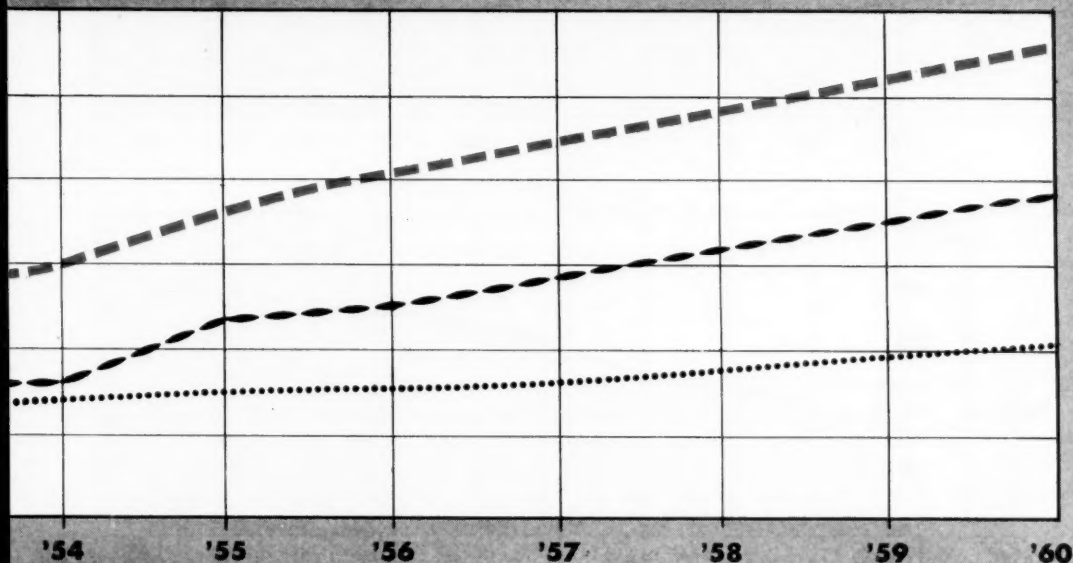
Methacrylates benefit from a structure free of tertiary hydrogen atoms, which means that transparent polymethyl methacrylate sheets and moldings can be used outdoors without undergoing ultraviolet degradation. Higher alkyl methacrylate polymers are being used to impart long-lasting viscosity improvement to lubricating oils.

Methacrylate-based auto finishes offer coatings of longer life, though at higher cost. Rohm & Haas has recently introduced a tough methacrylate copolymer for glass-reinforced plastics. Du Pont is encouraging synthetic-fiber reinforcement with methacrylate.

Two developments foreshadow stiffer competition in acrylics:

- Hawthorne Chemical (Louisiana, Mo.), a joint

Note: Cellulosies included with thermoplasts.



venture of Hercules Powder and Imperial Chemical Industries, will utilize the former's raw materials and the latter's methacrylates production know-how.

ICI's vigorous promotion of acrylics in Britain has captured a much larger share of the plastics market there than ICI enjoys in the U. S. (acrylics accounted for 2% to 3% of all U. S. plastics production in '56).

- Celanese will utilize Goodrich Chemical's know-how to produce acrylate esters in competition with Rohm & Haas and Union Carbide Chemicals.

Celanese agrees with other vinyl acetate makers that the right vinyl copolymer does as good a job as an acrylate, and at a lower price. But it has decided to join the acrylate paint-base producers, instead of trying to fight them.

The latex paint market is estimated at 100 million lbs./year of polymer. The breakdown: 70 million lbs. of styrene-butadiene; 20 million of vinyl acetate, 10 million lbs. of acrylate.

Acrylates are growing fast, could spurt ahead of vinyl acetate if the price becomes comparable.

NYLON

Nylon-6, Allied Chemical & Dye's caprolactam polymer, is making slow progress in the extreme-tough-

ness applications long dominated by Du Pont's nylon-66, polyhexamethylene adipate.

All the nylons are threatened to some extent by low-pressure polyethylene and other new plastics, but prospects still look good enough to entice Spencer Chemical and Foster Grant into the business. They'll polymerize Allied's monomer.

Nylon-6 is potentially cheaper than the older varieties, and Foster Grant, with its integrated molding operation, is in an excellent spot to solve the finicky processing problems that have been hindering the new product's utilization.

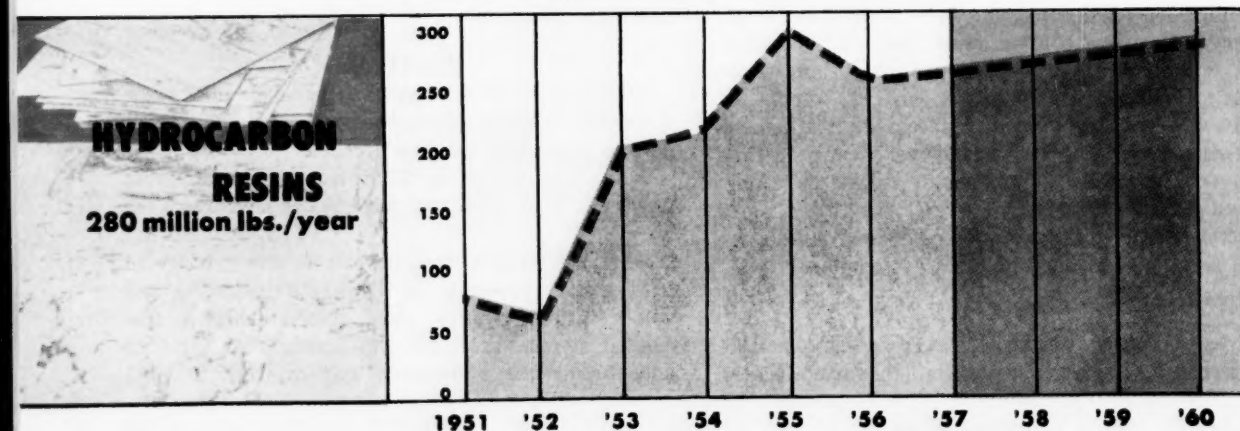
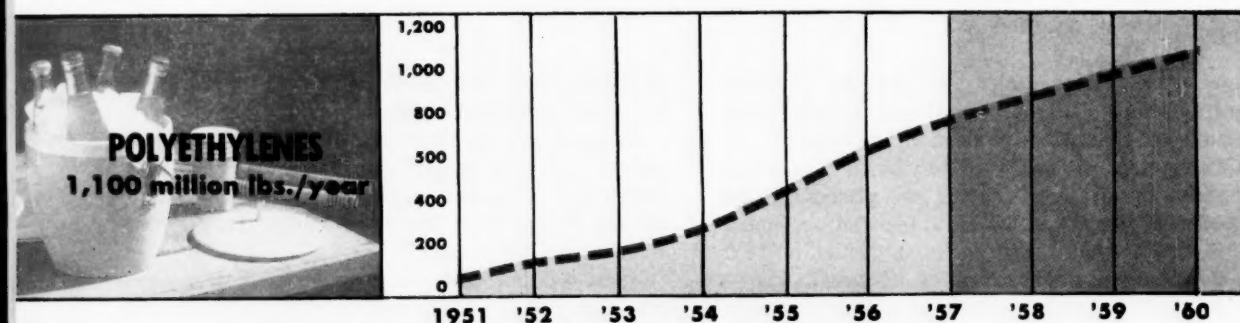
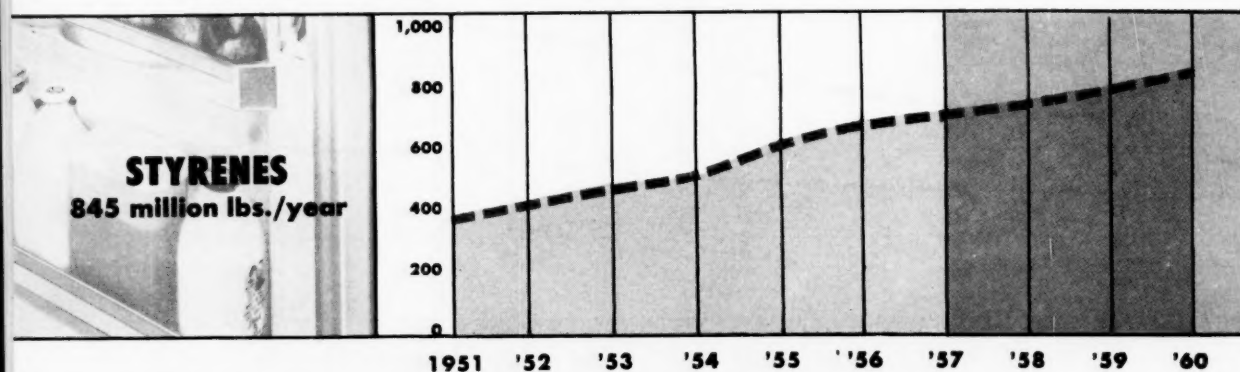
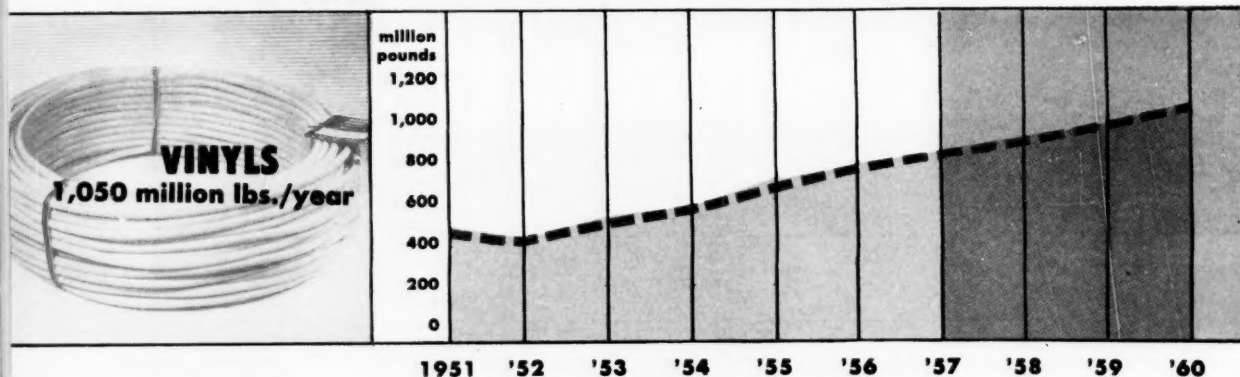
STYRENES

Styrene polymer production is perched uneasily on a plateau to which it climbed two years ago after a 20-fold production rise in a decade.

For a brief period, in '52, it led the thermoplastics in growth. Now vinyls and polyethylene have overtaken it.

Although there is cheerful talk in the industry of solid growth prospects in disposable packaging and indoor lighting fixtures, some observers believe that molded styrene polymers will continue to yield to polyethylene for housewares and toys, while vinyl

1960 Production Forecast for Five Big Thermoplastics



CW Report

acetate and acrylics creep up on the styrene-butadiene paint-latex market.

And the styrene export market, like plastics export markets generally, is drying up as new foreign capacity comes onstream.

A transparent high-impact styrene copolymer (which all producers are hotly researching) could brighten the styrene outlook considerably. Styrene-acrylonitrile copolymers, though difficult to mold, are making gains because of good resistance to heat and solvents. Tough terpolymers of styrene, butadiene and acrylonitrile are being extruded into ever increasing mileages of pipe and sheeting.

Cyanamid's methylstyrene homopolymer and copolymer with acrylonitrile are at last in production, offer better heat resistance, with lower gravities, and are in the same price range as their styrene counterparts. Methylstyrene from acetylene and toluene contains 33% of the rotation-hindering *o*-isomer, which is credited with raising the heat-distortion temperature.

When Firestone and Goodrich disclosed plans for greatly increased production of GR-S rubber, mostly 75/25 butadiene/styrene, styrene producers made an "agonizing reappraisal" of the price of styrene rubber-grade monomer. Result: a slash from 16¢ to approximately 12½¢/lb. to dissuade the rubber companies from building their own monomer plants.

But, the purer grade of styrene monomer, recommended for molding plastics, still stands at 16¢/lb. Meanwhile, polystyrene prices have dropped to 25¢/lb. In the blunt idiom of the price list, "no trespassing" signs have been posted by both monomer and polymer producers.

VINYLS

At 27¢/lb. or even a few cents less, the PVC business is still expanding and attracting newcomers.

In addition to several integrated companies (mostly film and sheeting calenderers) in the field, Escambia has come onstream with polymer, while Allied is

doubling monomer capacity and Ethyl will have its monomer plant ready next spring. A scramble for business, with pressure for price reductions, seems in the offing.

Once again, vinyl producers are well on their way to exceeding last year's production figures by a substantial amount, about 9% (*table, p. 118*). Floor coverings, mostly asbestos-vinyl tile, are already sharing the market on an even basis with the cheaper "asphalt" tiles (based on hydrocarbon resins). Vinyl protective coatings, especially for metals, are a rapidly growing outlet, as are molding and extrusion applications. Vinyl film, too, is making market gains.

Plastisols are finding widening markets in slush molding, as well as foam production. Bakelite's acquisition of Elastomer Corp. presages a big expansion in vinyl foams and sponges.

Rigid PVC pipe, easily bonded with solvent cements, should find more widespread use wherever corrosion resistance is needed. Much of this development will hinge on overcoming technological trouble spots.

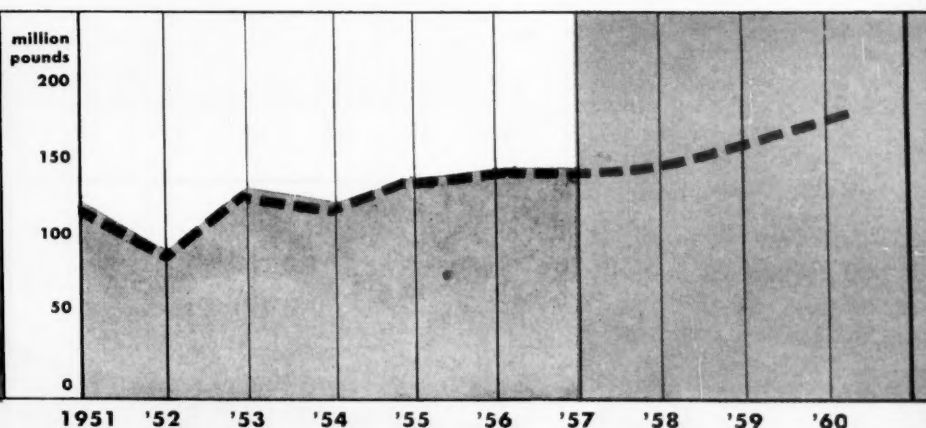
Vinyl acetate producers are pleased with the growing market acceptance of their product. Adhesives, textile sizes, vinyl chloride copolymers and especially latex paint are outlets expanding at a fast clip.

One producer figures on an industry total of 20 million gal. of vinyl acetate-based latex in '58. Total for all latex paints, including the heavily dominant styrene-butadiene-based paints, was 55 million gal. last year.

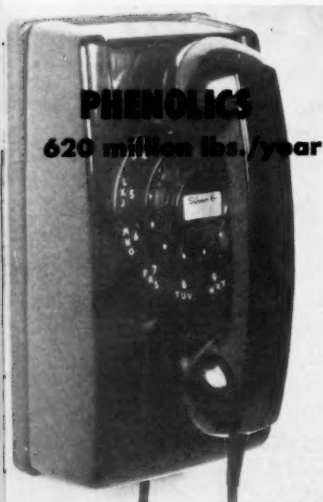
The automobile industry looks good again as a market for polyvinyl butyral.

Three newer thermosets—polyesters, epoxies and polyurethanes—may eventually break into the 100 million lbs./year group.

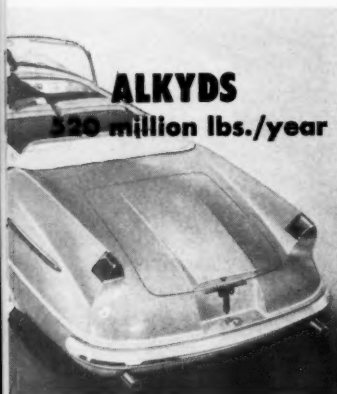
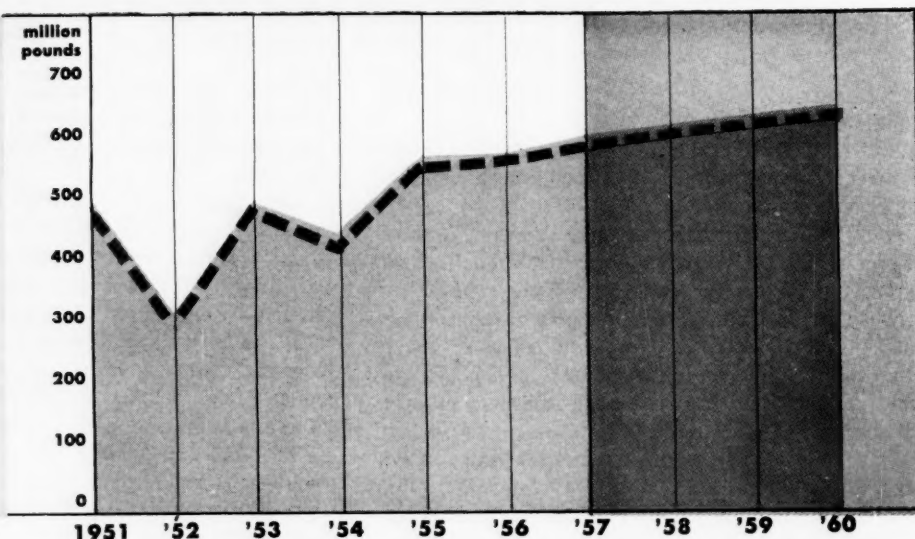
Polyesters are closest to the goal, may actually reach it this year. Epoxies are advancing rapidly, may increase in production to 36 million lbs. this year, should reach 100 million lbs. by '60. Polyurethanes, newest



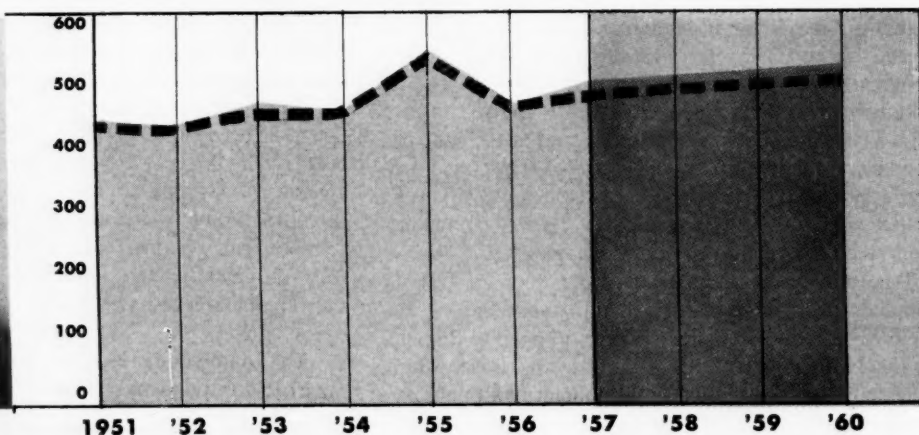
1960 Production Forecast for Five Big Thermosets



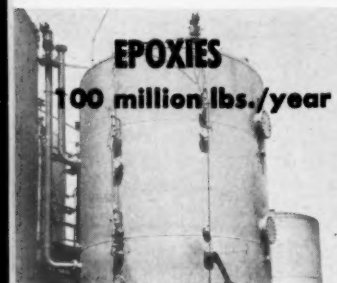
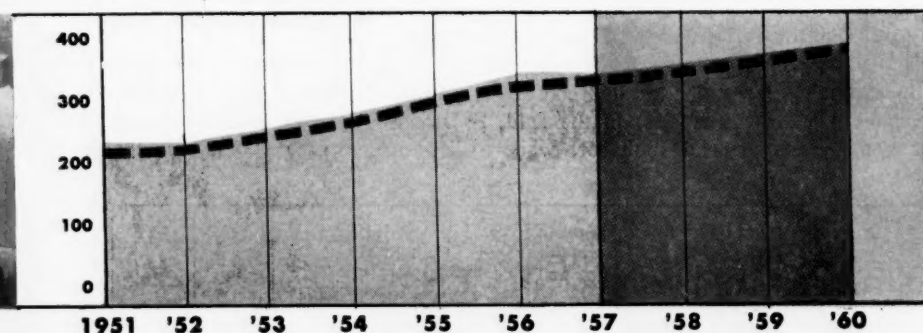
PHENOLICS
620 million lbs./year



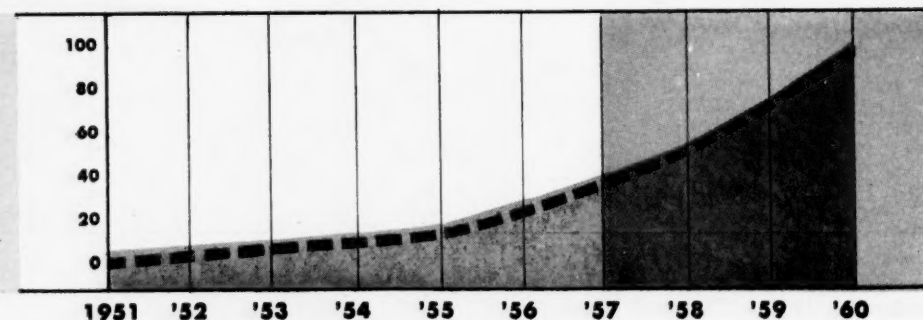
ALKYDS
520 million lbs./year



**UREA and
MELAMINE RESINS**
380 million lbs./year



EPOXIES
100 million lbs./year



of the three thermosets, are finally beginning to achieve the meteoric rise predicted for them.

Chemically, all three have this in common: they are two-stage resins in which the intermediate polymer is a linear or near-linear molecule of controlled length and composition.

This makes it possible for producers to build in properties surpassing those of the randomly branched phenolics and amino resins.

POLYESTERS

Honor without profit appears to be the fate of the polyesters. These are the combinations of glycol maleate-phthlate with styrene and the polyallyls that are usually reinforced with glass fiber and used for: boats, corrugated translucent panels, radomes, etc.

Polyesters are serving these markets well. Production hit 79 million lbs. in '56 and should be close to 100 million lbs. this year. But neither the resin suppliers nor the fabricators are particularly happy.

Chief difficulty is the low investment required to make or use polyesters. At least a dozen companies produce the bulk of resin output, and estimates of the total number of producers run from 50 to 140.

At the fabricating end, the situation is even worse. The larger items are made by custom lay-up procedures that squander man-hours. Estimating resin requirements for each custom job is often haphazard, subsequently results in waste. The industry is badly in need of industrial-chemical engineering services.

Premix molding, in which resin, fiber and filler are compression-molded, is one of the techniques that currently offers promising advantages.

EPOXIES

For epoxy resins, the outlook is uniformly bright. Resin suppliers have done an outstanding development job on their products. Although epoxies are double the

average cost of most plastics, their use continues to grow by something like 50% each year.

Excellent adhesion to metals and glass, low shrinkage on curing, high tolerance for fillers, toughness and cross-linking without external heat and without emission of volatiles are big sales points.

With the brashness of quiz kids, the epoxies offer answers to many fabrication problems. Two-thirds of all epoxy tonnages still go into the first well-developed epoxy end-use, chemically resistant primer coatings.

But other applications are gaining fast—tooling for the aircraft and automobile industries, potting and encapsulating of electrical components, adhesives, solders, patching compounds. With sand fillers, epoxies provide skid-resistant coatings for asphaltic concrete roads. The speedup in highway building, with increased emphasis on safety, could boom epoxy tonnages for such applications.

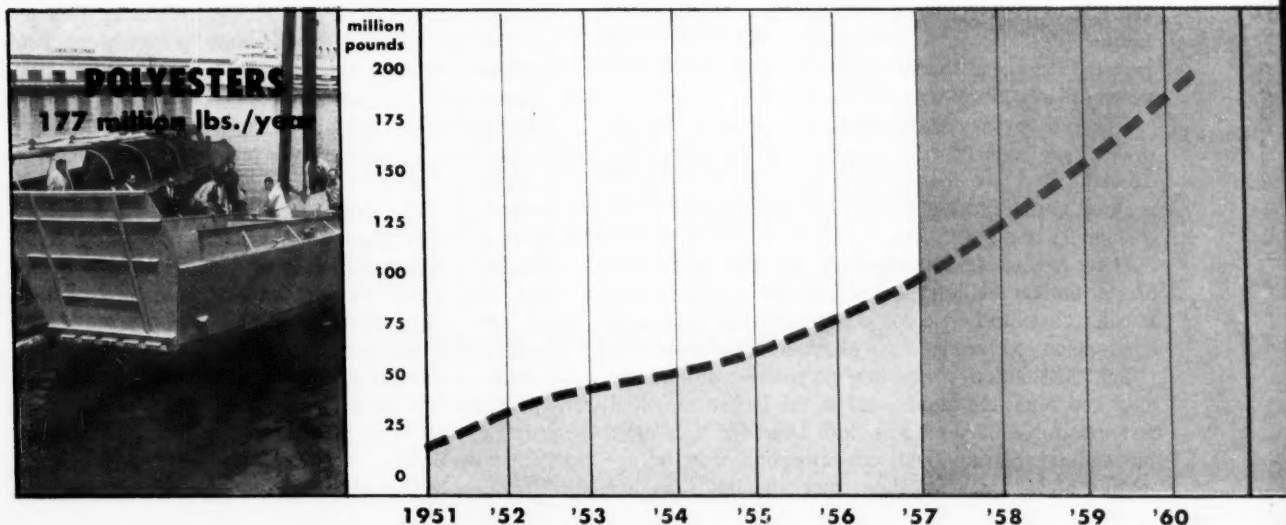
Epichlorohydrin, key raw material for epoxy production, is made by Shell, Union Carbide and Dow. The first two now share the epoxy market with Ciba and Jones-Dabney. Dow is certain to be a strong challenger.

Carbide's peracetic process for making epoxide intermediates from di-olefins should provide cheaper epoxies in the future.

POLYURETHANES

Imported from Germany just a few years ago, polyurethanes this year will yield some 8 million lbs. of flexible, semirigid and rigid foam. At densities usually less than 5 lbs./cu. ft., that's a lot of foam.

Producers' profits should have been big. Instead, some of the weary polyurethane pioneers have shut their doors. At fault was excessive feedback, the old bugaboo of market research communications. Optimistic voices had fallen on receptive ears, were amplified into echoes louder than the original signals. Foam capacity was "crash"-programmed to several hundred



What About This Year?

Based on the first seven months of production, total resin output in '57 should increase about 7% over last year. Here's how the two years should compare resin by resin:

	1956 (million pounds)	1957 (million pounds)
Thermoplasts		
Vinyl	760	830
Styrene	680	720
Polyethylene	566	710
Hydrocarbon	260	263
Cellulosic	147	150
Thermosets		
Phenolic	563	580
Alkyd	473	490
Urea and melamine	341	340
Polyester	79	100
Epoxy	26	36
Other thermoplasts and thermosets	235	201
Totals	4,130	4,420

million lbs./year, but the market hasn't yet developed.

Until recently, flexible as well as rigid urethane foam was based on polyesters with two or more terminal hydroxyls. Now the polyether glycols are taking over. Du Pont's Teracol is presumably the tetramethylene polyetherdiol from tetrahydrofuran. Carbide and Dow are offering polypropylene glycols with predominantly secondary hydroxyls; and Carbide has a polyether-hexane triol adduct. Wyandotte gets the more active primary terminal hydroxyls by block-polymerizing polypropylene glycol with ethylene oxide.

These propylene oxide derivatives are only half the price of polyester polyols based on adipic acid. Like Teracol, they give foams whose stress-strain behavior is closer to that of foam rubber, hence more suitable for cushioning and mattresses.

Here, too, the foam makers are sure that production of 100 million lbs./year is just a couple of years away. It can't come too soon for companies that have built large plants to produce polyurethane raw materials.

The auto industry is a big potential customer for rigid and semirigid foams, and is the largest potential customer for solid urethanes, too. Urethane tires have outstanding abrasion- and tear-resistance, may be especially useful for heavy-duty truck and bus tires.

Easy processing is being built in by using unsaturated polyesters and polyethers, which can be vulcanized with peroxides as well as with sulfur-accelerator combinations.

Other improvements, still under wraps, promise better building tack, compatibility with other rubbers and increased temperature resistance.

POLYETHYLENE

Of the polyolefins, polyethylene is by far the fastest grower—too fast, some fear.

Only five years ago, Bakelite and Du Pont were the only U.S. companies converting ethylene into translucent, waxy polyethylene pellets. Now there are a dozen. Capacity doubles every few years.

How are polyethylene producers faring? The old hands are having no trouble. But some of the newcomers are complaining of technological snafus and oversupplied markets. For conventional polyethylene alone, rated capacity is at least 100 million lbs./year over production rate, and the situation will worsen when new Bakelite, Du Pont and USI capacity comes in.

Perhaps the most encouraging aspect of the polyethylene situation is its increasing film use. One-and-a-half-mil polyethylene bags are rapidly becoming a preferred way of prepackaging.

Polyethylene film is making its mark, too, in farming and construction outlets—for lining irrigation trenches; covering wooden forms used in concrete molds; covering freshly poured concrete; replacing glass in greenhouses; keeping out rain where home construction is in progress. Laminated to kraft paper or aluminum foil, the film forms a permanent vapor barrier.

Another important plus factor in conventional polyethylene's future is that considerably lower prices will encourage wider usage. The market has been soft ever since the newer products came onstream. The resin is still listed at 35¢/lb., should slip to 20-30¢.

Besides conventional polyethylene, plastics marketers must now take the new low-pressure, high-density product into account. Koppers, Phillips, Hercules, Celanese are already offering low-pressure polyethylene commercially; others are due to follow. By the end of 1958, conventional and low-pressure polyethylene capacity will total well over 1 billion lbs./year.

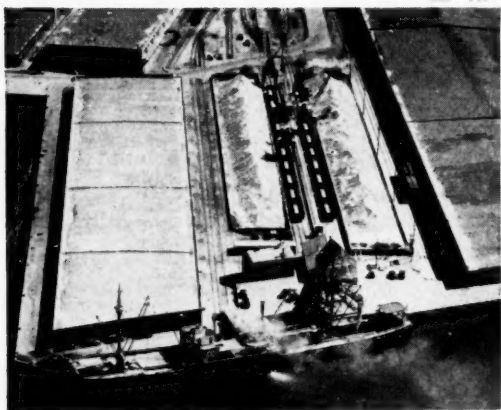
Chemical company sales managers are far from complacent about the bumper crop of low-pressure polyethylene. To some extent, they will invade the territory of other plastics, especially conventional polyethylene, vinyl and high-impact styrene. Beyond that, they must forage for new markets, base their pitch on the high heat resistance, modulus, strength and solvent resistance of their product.

Pipe is one of the rapidly expanding markets in which conventional polyethylene has excelled. Monsanto estimates that some 86% of all plastic pipe is made from polyethylene.

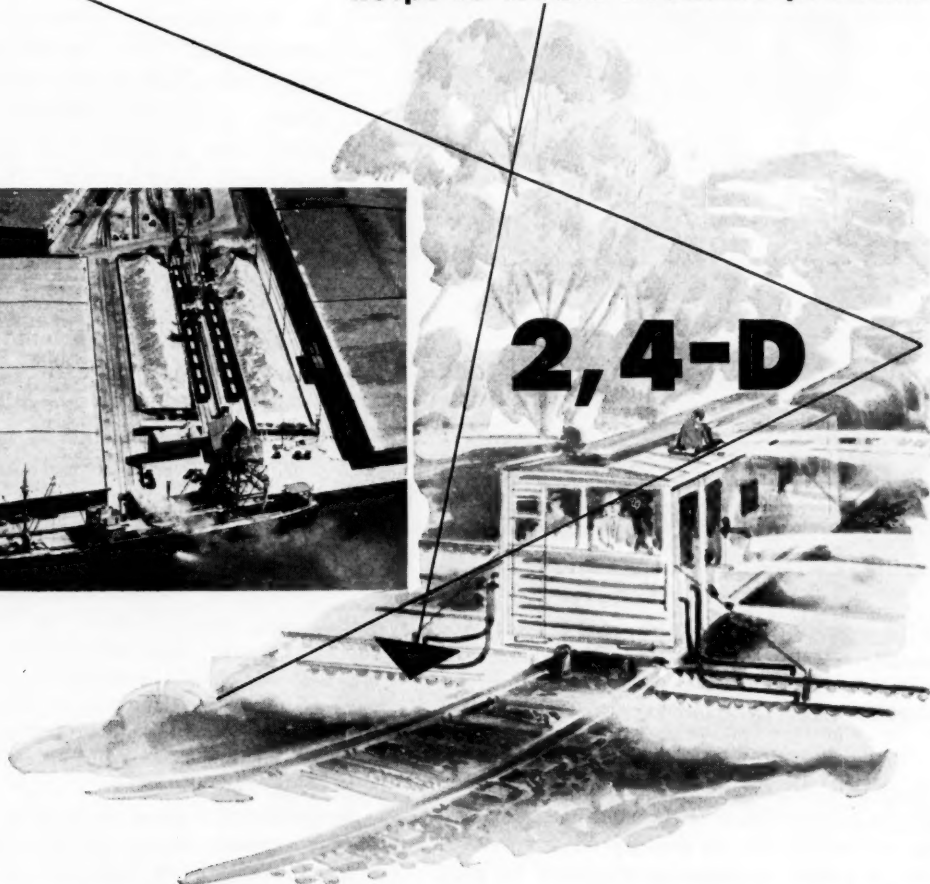
New polyethylene, with its higher burst strength,

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2,4-D



Naturalists have said that the forests would take over our cities in short order should all human activity cease. Railroads see vivid evidence of this on a small scale. They're constantly battling weeds on rights-of-way, on sidings, on spur lines.

Today, the battle is being fought more successfully than ever before with a new and

powerful broadleaf weed killer 2, 4-D. And this chemical is proving useful, too, in suburban areas.

Where does Sulphur fit into the picture? It takes Sulphur to make sulphuric acid. It takes sulphuric acid to make phenol. It takes phenol to make 2, 4-D.



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**"Of shoes—and ships—
and sealing wax—
Of cabbages—and kings—"**

But unlike the subjects of the *Alice in Wonderland* quotation, the articles surrounding CW report author Irving Skeist are all of plastic—women's shoes of glossy vinyl with butyrate heels, a one-piece boat molded from glass-reinforced polyester, "sealing wax" that's actually a fast-setting epoxy resin solder, shredded cabbage packaged in polyethylene film, and playing cards of flexible cellulose acetate.

Skeist is vice-president of the newly formed Skeist & Schwarz Laboratories (Newark, N.J.), a consulting firm that specializes in technical and economic studies of synthetic polymers.

should be welcome in the plastics pipe market. And if company researchers can free polyethylene from the catalyst fragments that mar its electrical properties, marketers can expect to capture important vinyl outlets.

POLYPROPYLENE

Isotactic polypropylene is already being produced by Montecatini in Italy. Made by the same heterogeneous-catalysis techniques that are used for linear polyethylene, polypropylene is under consideration by most polyethylene producers here. Some petrochemical producers may skip polyethylene altogether, enter the plastics field via polypropylene.

Isotactic polypropylene is stiffer than linear polyethylene, has higher tensile strength. Melting at 160 C, it looks promising as both a plastic and fiber. One possible defect: brittleness at low temperatures rules out its use for military applications.

OTHER OLEFINS

Other olefins may also be polymerized with heterogeneous catalysts to give isotactic structures. Carbide and Dow researchers have produced a wide variety of olefin-derived polymers spanning the range from elastomers to fibers, depending on the nature of the side chains.

Unbranched side chains of six to eight carbon atoms possess plasticizing properties, give rubbery materials

with melting points almost as low as that of natural rubber. On the other hand, some of the shorter-branched side chains are capable of stiffening the polymer, raising the melting point to 300 C or higher. For an aliphatic hydrocarbon, properties like these are unique. Some of these polymers will doubtless find commercial outlets.

Several research teams are working on thermoplastic olefin copolymers, and at least one company has made a cross-linkable liquid resin suitable for casting. Its price could be in the olefin-styrene range. Non-hydrocarbon monomers, though higher in price than ethylene and propylene, may be incorporated into copolymers to provide an occasional polarity point—a place for attaching water, dyestuffs, printing inks.

ACETALS

Du Pont has recently announced a new plastic, Delrin, which it describes as an acetal resin. It is tough, solvent-resistant and resistant to deformation under moderate loads at 100 C—a critical temperature because of the many end-uses for which "boilability" is desired.

What makes this thermoplastic especially interesting, despite its high specific gravity (1.425) is its projected price of 50¢/lb. At this figure, it could replace nylon for gears, bearings, aerosol bottles. It could even compete with butyrate for telephones and pipe, and with

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melamine for dishes. High fold- and hat of vinyls, nylon, fluorocarbons or tear-strength suggests its use as a laminating and packaging film.

Deldrin is believed to be polyoxymethylene, prototype of all polyethers, made from formaldehyde. Polyoxymethylene has long been available; but earlier resins contained impurities that caused degradation on heating. Thorough purification of both monomer and polymer (MacDonald's U.S. Patent 2,768,994) may explain the excellent stability of the new material.

POLYCARBONATES

Another promising new class of polymers, polycarbonates, has been undergoing intensive development at General Electric, Bayer and Eastman.

Like the glycol terephthalates (Terylene, Mylar, Dacron), the polycarbonates are saturated linear polyesters with a high proportion of *p*-phenylene groups that confer heat-resistance. They differ in the location of the aromatic group; in terephthalates, it is in the di-acid, while in polycarbonates, it is in the diol portion of the ester.

Another difference, even more important: raw material cost is lower. One of the most likely resins can be made by esterification of bisphenol-A with phosgene, should sell eventually for well under \$1/lb.

General Electric, looking first to the applications market it knows best, sees a future for this heat-resistant, thermoplastic in electrical applications—coil forms, insulating parts, appliance and electronic parts, telephone accessories, heating apparatus and batteries. In addition to good electrical properties, General Electric's polycarbonate Lexan has unusually high impact strength and hardness.

Although Lexan is a carbonate, its aromatic content makes it insensitive to water. Heat-distortion temperature is approximately 140 F, unusually high for a thermoplastic and well above

even Deldrin.

TOMORROW'S PLASTICS

In plastics, research shapes the future. Polymers that are making news today are the chemically well-ordered resins—linear polyethylene, isotactic polypropylene, the newer polyesters, epoxies and polyurethanes, polyoxymethylene (Deldrin), and the bisphenol polycarbonates. Tomorrow's news will likely concern the ultraheat-resistant resins—perfluorinated aromatics, inorganic-organic hybrids, and even completely inorganic polymers—all in the research stage now.

The influence of atomic energy is being felt in polymer science. Irradiated polyethylene, the first commercial irradiated plastic, is being used for high heat-resistant electrical insulation. Other uses may come forth as processing costs drop.

Graft polymerization—growing new branches from definite points on polymer chains—is becoming increasingly important. It can be used to achieve a desired molecular weight or particle-size distribution, or to bring together two monomers that won't otherwise copolymerize. Irradiation is a neat way to get the offshoots started.

As initiators of polymerization, beta, gamma, X rays and electrons have advantages over peroxides and other chemicals that supply free radicals. Where polymer purity is important, radiation can be depended upon to disappear without trace. Also, it permits solid-state polymerization of such monomers as vinyl carbazole, fumaric acid, acrylamide. Radiation is another polymerization starter.

Tough new plastics must be developed for use in jet planes, missiles, satellites—perhaps even space ships—and a host of other demanding military and civilian applications. This is the job ahead for polymer chemists and the chemical industry.

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AIR REDUCTION CHEMICAL CO. 88	PACIFIC CARBIDE & ALLOYS CO. 67
ALUMINUM CO. OF AMERICA 60-61	Agency—Boss C. Marble Adv.
Agency—Ketchum, MacLeod & Grove, Inc.	PATTERSON FOUNDRY MACHINE CO.,
AMERICAN AGRICULTURAL CHEMICAL CO.	THE 79
Agency—Marsteller, Rickard, Gebhardt &	Agency—Downing Industrial Adv. Inc.
Reed, Inc. Adv.	PENNSYLVANIA INDUSTRIAL CHEMICAL
AMERICAN CYANAMID CO. 11	CORP. 72
Agency—Hazard Adv. Co.	Agency—Downing Industrial Adv. Inc.
AMERICAN POTASH & CHEMICAL CORP. 97	PFIZER & CO., CHAS. 39
Agency—McCarty Co.	Agency—MacManus, John & Adams, Inc.
AMOCO CHEMICAL CORP. 31	PITTSBURGH COKE & CHEMICAL CO. 99
Agency—D'Arey Adv. Co.	Agency—W. S. Walker Adv. Inc.
ANSUL CHEMICAL CO. 110	PROPORTIONERS, INC., DIV. OF B-I-F
Agency—The Brady Co., Inc.	INDUSTRIES, INC. 104
ATLANTIC REFINING CO. 85	Agency—Horton, Church & Goff, Inc.
Agency—N. W. Ayer & Son, Inc.	REICHHOLD CHEMICALS, INC. 32-33
BADGER MFG. CO. 3rd Cover	Agency—MacManus, John & Adams, Inc.
Agency—F. P. Walther Jr. & Assoc.	ROCKWELL MANUFACTURING CO. 108
BECCO CHEMICAL DIV. FOOD MACHINERY	Agency—Marsteller, Rickard, Gebhardt &
& CHEMICAL CORP. 89	Reed, Inc.
Agency—John Mather Lupton, Inc.	ROHM & HAAS CO. 93
BIRD MACHINE CO. 86	Agency—Arndt, Preston, Chapin, Lamb &
Agency—Walter B. Snow & Staff, Inc.	Keen Inc.
BLOCKSON CHEMICAL CO. 12	RUBBER CORP. OF AMERICA 106
Agency—Wm. Balsam Adv.	Agency—Dreyer & Straub, Inc.
BOARDMAN CO., THE 92	SHELL CHEMICAL CORP. 2nd Cover
Agency—Erwin Wasey-Ruthrauff & Ryan, Inc.	SHIPPER'S CAR LINE CORP. 7
CALANES CORP. OF AMERICA CHEMICAL	Agency—Lewis Adv. Co.
DIV. 81	STANDARD OIL CO. 113
Agency—Ellinger & Co., Inc.	Agency—D'Arey Adv. Co.
CHEMICAL WEEK 8-9	STAUFFER CHEMICAL CO. 58
CHEMISRAND CORP., THE 69	Agency—John Mather Lupton Co.
Agency—Robert Luckie & Co.	STEARNS ROGER MFG. CO. 37
CHEMICAL SOLVENTS CORP. 5	Agency—Moher, Reimer, Williamson
Agency—Fuller Smith & Ross, Inc.	STONE & WEBSTER ENGINEERING
CONTINENTAL CAN CO. 28	CORP. 27
Agency—Batten, Barton, Durstine & Osborn Inc.	Agency—Harold Cabot & Co., Inc.
CRAWFORD & RUSSELL, INC. 90	TENNESSEE CORP. 34
Agency—PS Advertising, Inc.	Agency—Crawford & Porter, Inc.
CUNNINGHAM-LIMP CO. 44	TENNESSEE PRODUCTS & CHEMICAL
Agency—Forrest U. Webster	CORP. 100
DISTILLATION PRODUCTS INDUSTRIES,	Agency—The Griswold-Edelman Co.
DIV. OF EASTMAN KODAK CO. 80	TEXAS CO. THE 2
Agency—The Rumrill Co., Inc.	Agency—G. M. Basford Co.
DORR-OLIVER, INC. 56	TEXAS GULF SULPHUR CO. 123
Agency—Sutherland-Abbott Adv.	Agency—Sanger, Funnell Inc.
DOW CHEMICAL CO. 50-51, 106	TITANIUM PIGMENT CORP. 20
Agency—MacManus, John & Adams, Inc.	Agency—Doyle, Kitchen & McCormick, Inc.
DRAVO CORP. 4	UNION BAG-CAMP PAPER CORP. 38, 107
Agency—Ketchum, MacLeod & Grove, Inc.	Agency—Smith, Hagel & Knudsen Inc.
DUPONT DE NEMOURS & CO., INC. E. I.	UNION CARBIDE CHEMICALS CO., DIV.
EXPLOSIVES DEPT. 25	OF UNION CARBIDE CORP. 13, 98
Agency—The Rumrill Co., Inc.	Agency—M. Mathes, Inc.
DUPONT DE NEMOURS & CO., INC. E. I.	U. S. INDUSTRIAL CHEMICALS CO. 101-102
RASSELL DIV. 68	Agency—G. M. Basford Co.
Agency—Batten, Barton, Durstine &	VICTOR CHEMICAL WORKS 63-66
Osborn Inc.	Agency—The Buchen Co.
DURIRON CO., THE 14	WESTVACO MINERAL PRODUCTS DIV. OF
Agency—Kircher, Helton & Collett, Inc.	FOOD MACHINERY & CHEMICAL
EASTMAN CHEMICAL PRODUCTS INC. 94	CORP. 77
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EMERY INDUSTRIES, INC. 40	C. R. WILLIAMS & CO. 76
Agency—Erwin Wasey-Ruthrauff & Ryan, Inc.	Agency—William H. Hitch, Inc.
FLUOR PRODUCTS CO. 47	WYANDOTTE CHEMICAL CORP. 15
Agency—Hixon & Jergensen	Agency—Brook, Smith, French &
GENERAL AMERICAN TRANSPORTATION	Dorrance, Inc.
CORP. LOUISVILLE DREYER DIV. 35	tracers SECTION
Agency—Edward H. Weiss & Co.	(Classified Advertising)
GENERAL MILLS, INC. CHEMICAL DIV 105	F. J. Eberle, Business Mgr.
Agency—Knox Reeves Adv. Inc.	CHEMICALS: Offered/Wanted 125
GOODRICH-GULF CHEMICALS, INC. 41	EMPLOYMENT 125
Agency—The Griswold-Edelman Co.	EQUIPMENT: Used/Surplus New
GOODYEAR TIRE & RUBBER CO. 1	For Sale 126
Agency—Kudner Adv. Agency	WANTED 126
GRAVER TANK & MFG. CO. 10	MANAGEMENT SERVICES 127
Agency—Ladd, Southard & Bentley, Inc.	SPECIAL SERVICES 126
GROSS & CO., A. 54	
Agency—G. M. Basford Co.	
HERCULES POWDER CO. 19	
Agency—Fuller & Smith & Ross, Inc.	
HEYDEN NEWPORT CHEMICAL CORP.	
Osborn Inc. 4th Cover	
HOOKER ELECTROCHEMICAL CO. 71	
Agency—O. S. Tyson & Co., Inc.	
JEFFERSON CHEMICAL CO., INC. 57	
Agency—Hazard Adv. Agency	
JEFFERSON LAKE SULPHUR CO. 104	
Agency—Bauerlein Adv. Inc.	
KELCO CO. 36	
Agency—Cayton, Inc. Adv.	
KENDALL REFINING CO. 62	
Agency—Barber & Drullard, Inc.	
KOPPERS CO., INC. CHEMICAL DIV. 109	
Agency—Batten, Barton, Durstine &	
Osborn Inc.	
LIQUID CARBONIC CORP. 44	
Agency—Fletcher D. Richards, Inc.	
LUCIDOL DIV. OF WALLACE & TIERNAN,	
INC. 108	
Agency—Barber & Drullard, Inc.	
LUMMUS CO., THE 16	
Agency—G. M. Basford Co.	
MAAS & CO., A. 78	
Agency—Heints & Co., Inc.	
METASAP CHEMICAL CO. 96	
Agency—Lewin, Williams & Saylor	
MILLMASTER CHEMICAL CORP. 6	
Agency—The House of J. Hayden Twiss	
MINERALS & CHEMICALS CORP. OF	
AMERICA 42	
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CARBIDE CORP. 35	
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Alpine 5-2981	
Detroit 26	856 Penobscot Bldg.,
H. J. Sweger, Jr., Woodward 2-1793	
London	H. Lagler, McGraw-Hill House,
95 Farrington St., E.C. 4, England	
Los Angeles 17	John B. Uphoff, 1125
West Sixth St., Madison 6-9351	
New York 36	Knox Armstrong,
E. A. Johnson, P. F. McPherson, Charles	
P. Onasch, L. Charles Todaro, 500 5th	
Ave., Oxford 5-5959	
Philadelphia 3	William B. Hannum, Jr.,
Architects Bldg., 17th & Sansom Sts.,	
Rittenhouse 6-0670	
Pittsburgh 22	V. K. Disette, Room 1111
Henry W. Oliver Bldg., Atlantic 1-4707	
San Francisco 4	William C. Woolston,
68 Post St., Douglas 2-4600	
St. Louis 8	3615 Olive St.,
Continental Bldg., R. J. Clausen, JEF-	
erson 5-4867	

C H A R T I N G

B U S I N E S S

October 26, 1957

UNDERWOOD & UNDERWOOD



Dollar Sales Climb, but Fewer Gallons Sold

Total sales of paints, varnishes and lacquers may climb to \$1,640 million in '58, topping this year's estimated sales of \$1,600 million. About 60% will be trade sales, and 40% industrial.

Although dollar volume will likely be higher, total gallons consumed will be less. Reason: paints cost more today, go further.

Some 55 million gal. of latex paints based on buta-

diene-styrene, polyvinyl acetate, acrylics were sold in '56. By '61, latex-paint sales may double.

And, the trend toward colored paints for industrial installations is continuing, especially in the chemical and petroleum industries.

The industry estimates that 12 million homes have not been painted in six to 10 years. Look for a strong paint promotion campaign to tap this market.

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with a difference

*from initial negotiations... to "on stream"
you deal with Badger principals*



You first make contact with Badger through a Key Man as he works with you and your engineering staff in pinpointing your processing and economic problems.



The Key Man, acting in your behalf, takes your problem to Badger engineering specialists for preliminary study and evaluation.



With recommendations approved and construction underway, the Badger Key Man is still on the spot coordinating activities. He remains in charge until your project is complete.

An engineering project handled by Badger is a group effort involving many highly developed skills. And from first contact until the project is complete these experienced specialists are headed by a Badger Key Man. More than just a sales engineer, he is always a Badger principal — always the Key Man in the execution of the project.

This sensible operating policy, which channels project liaison, coordination and administration through a company principal, is important to you and your project. You will find that most policy level decisions can be made on the spot as situations require. Further, the Key Man's depth of experience means you deal with an executive-engineer who talks your language — knows your problems and how to find their solutions.

Many clients say Key Man Policy is the Badger difference that makes the difference. Wouldn't it be wise to inquire how it could serve to make your projects more successful?

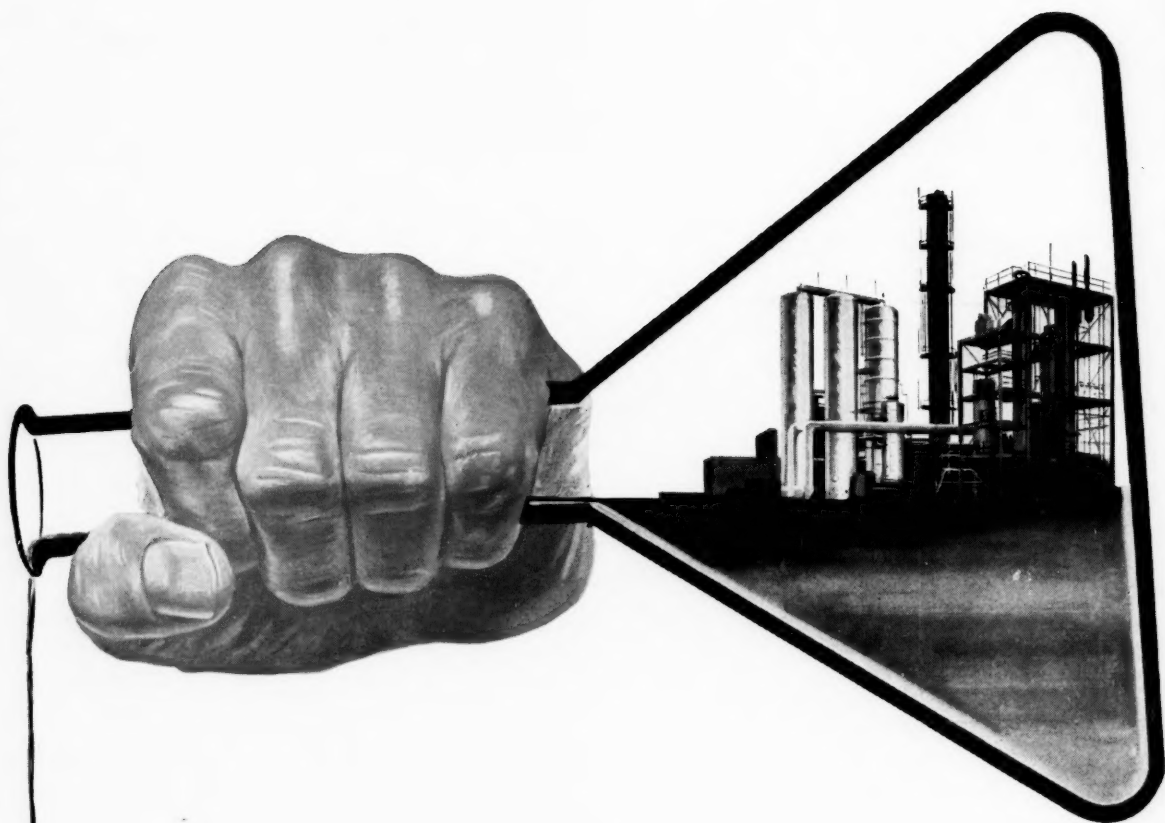
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